RAILROAD GAZETTE

SATURDAY, APRIL 12, 1873.

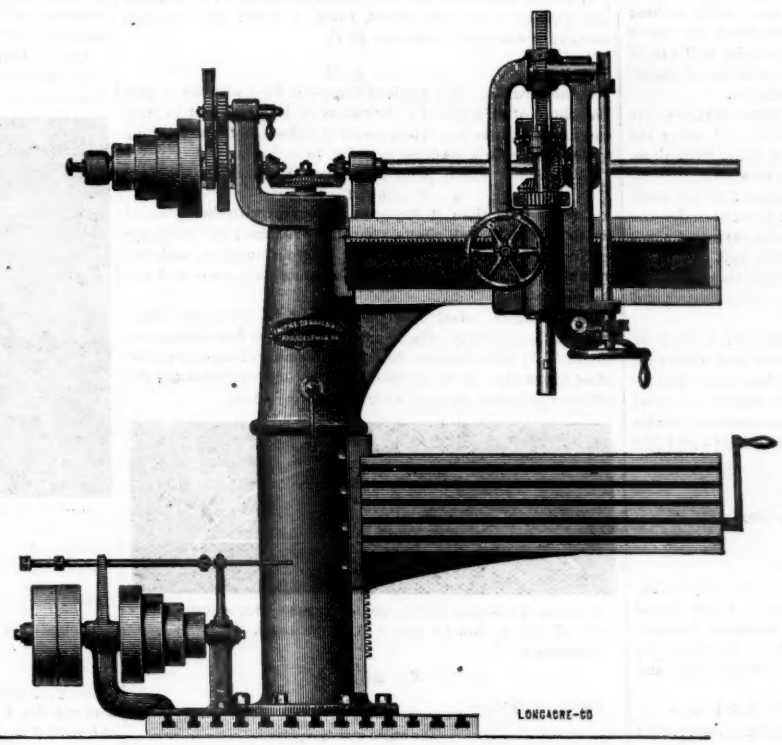
Radial Drilling Machine.

The engraving represents an improved radial drilling machine, manufactured by the firm of Thorne, De Haven & Co., of Philadelphia. It is unneccessary for us to say anything of the utility of this tool in a shop, as those of our readers who have used such a machine will be quite prepared to admit its usefulness.

In the machine in question, the countershaft is on the base and the driving-cone pulley and back gearing on top of the post, permitting the belt shifter to be placed in a convenient position so that a change of speed can be made quickly. The gearing is so placed that the arm can be rotated through an arc of 320 degrees. The cone has four steps, giving, with the back-gearing, eight changes of speed. The saddle carrying the spindle is traveled on the arm by a rack and pinion operated by a hand wheel. The spindle is counterbalanced by a weight which is carried by the saddle. This, we believe, is a new feature in drills of this description. It is claimed that the counter balance taking directly on the spindle prevents the latter from dropping in the event of lost motion between the spindle and feed-rack, thus obviating one source of breaking drills. The feed is obtained by a rack and pinion. The self-acting feed has three speeds and is thrown in by a friction clutch, operated in the center of the hand-wheel. The hand-feed is quick, enabling the drill to be run up quickly.

The table has T-slots on top and side, and is raised and lowered on the post by a rack and pinion, operated by a tangent wheel and worm. The table is gibbed to the post, which, it is claimed, reduces the leverage and makes a stronger and stiffer arrangement than where it is set on a base-plate. When the work is too high to go on the table at its lowest position, it can be put on the base-plate, which projects from the front of the machine.

This appears to be an excellent design of a useful and in many cases indispensable machine.



RADIAL DRILLING MACHINE.

Pyrotechnic Railroad Signals.

The Allentown *News* of March 21 says: "Each passenger train now leaving Camden Station, Baltimore, is provided with a set of signals, which, if properly handled by those persons whose duty it will be to use them, will prevent accidents by one train running into another. For instance, should an engine fail in making steam or jump the track, or a delay be caused by other means, the rear brakeman will be required to place on the track as far in the rear of the last car as possible a torpedo, which, when pressed by the wheel of a locomotive, will explode with such a report that the engineer will know that there is danger ahead. Should the torpedo fail to explode, another signal will warn the advancing engineer of danger. This will be by means of a pyrotechnic signal, and will be placed between the torpedo and the disabled train. This last signal is ignited by striking one end of it upon a stone or hard substance. This causes a cap to explode, and the next instant a lurid flame of red or blue light isemitted from the signal stick after the manner of a blue-light. These pyrotechnic signals are provided with a sharpened piece of metal, and can be driven into the earth or a cross-tie with a slight movement, and the flaming signal will burn for nearly thirty minutes, and should it accidentally fall into water or snow the light will not be extinguished, but burn the same as if in an upright position. In order to have the signals and torpedoes ready at a moment's notice, they are to be placed in a stout case made of galvanized zinc and given in charge of the rear conductor of each passenger train. Each box will be supplied with a set of signal flags and a number of small pyrotechnic signals, to be held in the hands of brakemen while they run to the forward and rear of disabled trains to warn approaching trains.

Missouri Railroad Suits.

The St. Louis *Republican*, of March 29, says:

"Attorney-General Ewing has associated with himself, as counsel for the State in the railroad suits, Messrs. Hill & Bowman, of St. Louis, and Messrs. Phillips & Vest, of Sedalia. The suits are being brought under a resolution of instructions adopted by the General Assembly, and are intended to test the constitutionality of the acts by which the lien of the State in the Pacific and the North Missouri railroads was sold. The disposition of both the counsel for the State and for the railroads is to obtain, if possible, a speedy determination of the question, and the latter favor the presentation of an agreed case, which will probably be done. The amount stated to be involved is thirteen millions—six millions on account of the Pacific, and seven on account of the North Missouri.

"A consultation took place between the counsel for the State yesterday, but it was not decided whether to commence the suits in St. Louis or in Sedalia. The papers in the cases will be prepared in a few days.

Mobile & Little Rock.

This newly organized company purposes to build a railroad from some point on the Mobile & Ohio road near Enterprise, Miss., 120 miles north of Mobile, northwest to the Mississippi River to connect with a road leading to Little Rock, Ark. The corporators are: S. D. Brown, M. D. Graham, Lewis Troost, H. Broun, A. R. Carter, Charles D. Brown, W. H. Ross, S. L. Terrell, Sr., T. F. Pettus, W. H. Hardy, S. B. McWilliams and S. S. Calhoun.

Contributions.

Hints for the Season—Ballasting, &c.

Now that Winter has loosened his icy grip, and things that have been held fast in his cool embrace for many long months are once more movable by the power of man, railroad men will experience a pleasant relief from the prison-like duties of winter railroad employment. There will now be a change in the programme, and every one employed outside the office will be called upon to perform many duties of a different nature from his every-day work while in winter-quarters. Track-men will find much to do to keep things safe and snug, and train-men must be ever watchful, for danger is lurking where it is least expected. The tiny rivulet hath charms for the poet when it "sets out on its journey to go to the sea," but its "soft murmuring" is doleful music for the ears of those who have seen an entire train swallowed in an awful chasm formed in a few hours by the action of a treacherous "sparkling streamlet." Track-men should keep a sharp eye on all watercourses, from the smallest ditch and culvert to the largest stream and bridge. It is the former that are the most dangerous and are usually the most neglected. Accidents from the falling in of culverts at this season are frequent, and they should be thoroughly examined as often as possible, to make sure that no undermining is going on. It is not sufficient that they are all right to outside appearances, but, like some of us, they are not safe without being tested to the bottom. When the earth is deeply frozen, it not unfrequently happens that water finds a passage across the embankment *back* of the foundation of a bridge or culvert, and beneath the frost. This is not usually discovered in time to prevent mischief. The motion of the water should be closely observed at bridges, culverts, etc. A secret passage of water back of or underneath the masonry of a culvert or bridge may be known by an eddy or whirlpool on the up-stream side of an embankment, near the face of the masonry or timber work, and a "boiling" motion on the opposite side. The section master should either go himself or send a trusty man over the section frequently, to note the changes in water currents and see whether any flood-wood, floating ice, etc., has lodged in any water-course. Box and arch culverts should not be forgotten. The smallest stream out of its proper course should be attended to at once.

Rocks and boulders that have remained firm for years on slopes and mountain sides need close attention. Accidents from snow slides will now give place to avalanches of earth and rocks. Broken rails will be less frequent, but the breakages will continue to be a source of much trouble until the frost is entirely out of the ballast and road-bed. It is not the effect of frost on the iron alone that causes frequent breakages, but its great disturbance of sleepers, thus giving uneven and insufficient support. When the frost has *all* left, and the ties have *all* come down to a good bearing, broken rails will be less frequently met with. Until then, "look out." At this season track-men can scarcely make better use of their time than by keeping their eyes wide open and watching things generally; for at no other time of year are there so many accidents from causes "unlooked for" as at the breaking up of winter.

In the more southern parts ballasting will now commence, and much of this work will be done in the Northern and Eastern States as soon as the condition of the road-bed will allow. Some preparation will be necessary on most roads before ballasting can be done in a thorough manner. On old roads, where the track has formerly been raised to a grade with bridges, culverts, etc., it will be necessary to provide timbers of the proper dimensions for supporting the rails on the bridges, if of wood, to a height corresponding to that on the grade. If the rails on the bridges have been supported by cross-ties resting on stringers, it is advisable to place other stringers on the cross-ties, thus giving the rail a continuous longitudinal support, which not only prevents accident from broken rails but reduces the vibration and strain caused by passing trains. Of course the cross-ties should be securely fastened, that the stringers or rail-plates may in turn be secured to them to prevent spreading.

In this connection it may be well to bring to the mind of the reader the importance of securing the rails on culverts, cattle-guards, bridges, etc., in a more thorough manner than is usually the case. "Spreading of the track" we see reported as the cause of several serious accidents recently. This is the result of nothing short of gross ignorance and stupidity, and is the most inexcusable of all railroad accidents.

In securing stringers of bridges it is not sufficient that they are bolted to timbers singly and independent of each other. They should in some manner be fastened together. Dove-tailing plank across them at the top at intervals of five or six feet is a secure way of fastening. It is not uncommon to see rails stretched across culverts, etc., of a width of from 8 to 12 feet, and not a spike to hold them. This should be attended to in ballasting, not only by seeing that the rails are well spiked to the stringers, but that the stringers are secured to the substructure and also "dove-tailed" together as above mentioned.

Stringers should not reach beyond their bearing on culverts, as that renders them liable to "rock" and move out of place, throwing track out of line and shaking the entire structure. There is more stability in short stringers.

Some engineers in charge of construction build all small culverts to full grade calculating that when the track is ballasted they will be correct without being disturbed. This is a bad practice. Many cattle guards and culverts are located so that the rails will cover them, leaving several feet of the rail at either side of the opening. When the ties settle into the unballasted road-bed the ends of the rails are brought so much lower than their centers (which are already high) that the rails are bent in the form of a rainbow and are liable to break from the excessive strain at the ends of the stringers. And besides it gives a road a slovenly appearance to see the tops of culverts "sticking up" above the grade. It is better to construct the masonry or timber work of culverts in such a manner that the stringers will lay at sub-grade (with the road-bed), and when the track is raised, transverse timbers may be placed under the stringers, raising them the proper height to bring the track to a true grade. Bridges of iron and heavy masonry, truss bridges, long trestles, engine houses, water tanks, depot buildings of stone or brick, shops and all structures of a permanent character should be built to full grade. Sufficient ballast should be provided to give an easy approach to these until the entire ballasting is completed. In short, the grade should be kept as uniform as possible both before and after ballasting. The heights and depressions so numerous on some roads are a great nuisance in running trains, and the road has the appearance of poverty and shiftless management.

Overhead bridges should be examined before raising the track, and, if not high enough for safety, should be raised. This is frequently neglected or overlooked, and the loss of many lives is the consequence. In raising old track where a portion of the ties are decayed, enough new ties should be distributed (after the ballast) so that they can be put in the track when it is raised and before filling in the ballast. In this way much labor can be saved and the work done in a more thorough manner than by renewing ties after ballasting, as is frequently done.

Some roads have been built in parts of the country where no gravel could be obtained for ballast, and as it was thought that no ballasting would ever be done there, the bridges, station buildings, etc., were built accordingly, on a level with the earth embankments. Now, however, broken stone is being used extensively for ballast, and those roads are to be raised. In such cases it will be necessary to prepare timbers to be used at bridges, etc., so that they may be raised (or the track to them) to preserve the true grade, which can be done without injury to the bridges. If properly done they will be improved by the raising.

WM. S. HUNTINGTON.

Car Hoist for Transferring Car Bodies from Tracks of One Gauge to those of Another.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The St. Louis & Southeastern Railway Company has recently completed an arrangement for transferring cars across the Ohio River, between Evansville, Ind., and Henderson, Ky. The transfer tracks and incline tables are upon the plan of those used by the Iron Mountain Railroad at Columbus, Ky., and Belmont, Mo. The cars are carried upon barges, of which there are two, one for freight and the other for passengers. These barges are among the strongest ever built upon the Ohio River, and are, respectively, 160 and 130 feet in length, with a carrying capacity of ten loaded freight cars and two Pullman sleepers.

The incline tables are 130 feet long, and are fitted with wheels of different diameters, which run upon the transfer tracks,

Under the upper ends of these tables are placed friction slides, which act as brakes and hold them in their proper positions in relation to the barges. As the water in the river rises or falls the tables are drawn up or pushed down, so as to always accommodate themselves to the heights of the boats. The difference between extreme high and low water at the points of transfer, being over forty feet, necessitates long inclines or approaches—those at Evansville and Henderson being 1,200 feet each.

As the gauge of the St. Louis Division of the Southeastern is 4 feet 9 inches, and that of the Nashville Division 5 feet, the trucks of both freight and passenger cars are changed by means of a car hoist or elevator, located at Henderson. The hoist is adapted to both passenger and freight cars, shifting one of the former or two of the latter. It is constructed upon the screw principle, and has eight large screws working in heavy cast-iron nuts which run in guides secured to oak posts. On these nuts are bolted two large pine stringers running the entire length of the machine, and to these stringers or hoist beams are fitted eight wrought-iron stirrups working on rollers; these stirrups hold in position the lifters and these latter run under the bodies of the cars near the transoms and can be pushed in and out at will.

The screws are operated by means of gearing, and the whole is run by a small stationary engine, with the starting and reversing gear so placed that the operator has everything under his eye.

When preparing to hoist, the stirrups are placed in their proper positions and the lifters are pushed under the car or cars. The time occupied in hoisting is but a trifle, as it can be done in less than half a minute. The whole operation of changing will not occupy more than five or six minutes.

The trucks are shifted by means of two traverse tables, one at each end. These tables run upon tracks and carry the trucks to a siding, conveniently placed, and bring back those of different gauge. It will be seen that by this arrangement, when two cars of different gauges are changed at the same time, the trucks of one car are simply run forward under the body of the other, thus effecting a considerable saving of time. As most of the changing will be done in this way, the utility and economy of such an arrangement can easily be seen. The plan of changing trucks by switching is too complicated and requires too much time.

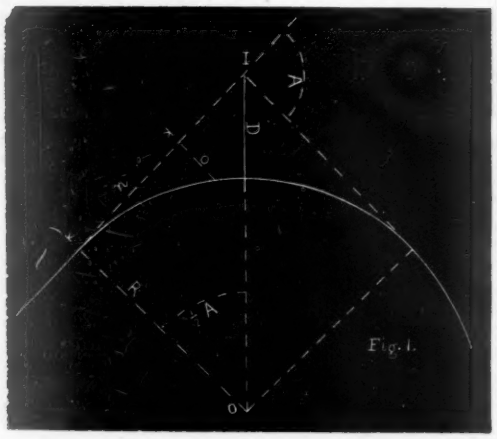
Everything about the machinery is constructed in the most solid and substantial manner. The frame-work is of white oak, thoroughly braced and bolted. Great care has been taken in its erection to perfectly fit all its parts and make it the most successful hoist in the country. It has been constructed under the immediate supervision of David Jones, Esq., Civil and Mechanical Engineer.

Some Labor-Saving Formulæ.

To the Editor of the Railroad Gazette:

I send you the following miscellaneous list of labor-saving formulæ for the benefit of whom it may concern. I have found them much more convenient than any in common use, and doubt not most of them will be so to others, though they are all very easy to solve mathematically; given sufficient time and paper.

None of them have ever been in print before that I know of, and all are original, except No. 12, an exceedingly convenient formula for many purposes, and I have never met any engineer who was acquainted with it, except those from the office of John B. Henck, of whom I learned it.



1. Given the radius, R, and total angle, D, of a curve, to determine distance D (fig. 1).

Formula.—

$$D = \frac{R}{\cos \frac{1}{2} A} - R$$
$$= R \times (\text{reciprocal of } \cos \tfrac{1}{2} A - 1)$$

Demonstration.—The distance $IO = R \sec \frac{1}{2} A$, and the secant of an angle $= \frac{1}{\cos}$, or the reciprocal of the cosine. We then subtract R from the distance IO.

Example.—6° curve for 70°.

$$\cos \frac{70°}{2} = .819$$

into radius 955 gives

$$1166 - 955 = 211 \text{ feet.}$$

The same result is reached, perhaps, more simply by the table of reciprocals, especially when absolute accuracy is not required, as follows: Take first three decimals of the cosine. Treating them as a whole number, take its reciprocal and point off first three decimals; the remaining decimals are a coefficient which

$$\times R = D$$

In above example,

reciprocal of 819 = .001221
.221 × 955 = 211 feet

2. Given radius and total angle, A, of a curve, to determine change in position of the center of the curve by taking a new radius; or the change, $= x$, in the value of D, fig. 1.

Formula.—

$$x = R \propto R' \text{ (reciprocal of } \cos \tfrac{1}{2} A - 1)$$

Demonstration.—Let

$$D \pm x = D'$$

then, by formula 1,

$$D' = R' \text{ (reciprocal of } \cos \tfrac{1}{2} A - 1)$$
$$D = R \text{ (reciprocal of } \cos \tfrac{1}{2} A - 1)$$
$$x = D \pm D' = R \mp R' \text{ (reciprocal of } \cos \tfrac{1}{2} A - 1)$$

Example.—6° curve for 90°; substitute a 5°.

$$\text{cos. } \frac{90°}{2} = .707$$

Reciprocal of 707 = .0014144
.4144 × 191 (= 1146 − 955) = 134.35

3. Conversely, given x in formula 2, required the new radius.

Formula.—

$$R' = R \pm \frac{x}{\text{reciprocal of cos } \frac{1}{2} A - 1}$$

4. Given the P. C. of a d degree curve, to determine the offset O to the curve, from a point on tangent, distant n stations from the P. C.

Formula.—

$$O = \tfrac{1}{6} n^2 d$$

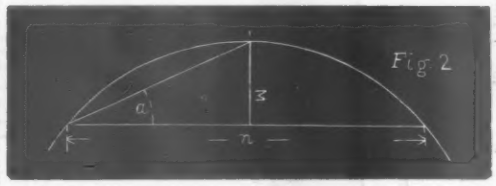
Demonstration.—The angle of deflection for n stations $= \frac{1}{2} nd$. The chord of an angle of 1° for radius of 1 station is 1.75 feet, and for n stations $\frac{1}{2} n$. Then *angle of deflection* for n stations × chord of 1° for n stations $= \frac{1}{2} nd \times \frac{1}{2} n = \frac{1}{4} n^2 d$.

Example.—2° curve, point on tangent 800 feet distant.

$$\tfrac{1}{6} \times 8^2 = 56 \times 2 = 112 \text{ feet}$$

Error.—Less than .1 for ordinary curves with distances of 200 to 400 feet. Such offsets are usually required to judge approximately where a curve will fall before running it, and the formula is then sufficiently correct for almost any curve and any distance.

On a 1° curve, offset 1,500 feet from P. C., we obtain 196.9; true distance, 197.9. On 4° curve, offset 500 feet distant, we obtain 87.5; true distance, 88.6. The formula always gives the offset too small. It is capable of numerous modifications for different purposes, some of which are given below.



5. On a d degree curve, to determine the middle ordinate M, fig. 2, for an arc n stations long.

Formula.—

$$M = \tfrac{1}{8} \left(\frac{n}{2}\right)^2 d$$

Demonstration.—

$$\text{The angle } a = \tfrac{1}{2} \frac{nd}{2}$$

$$\text{The chord of 1° for } \frac{n}{2} \text{ stations} = \tfrac{1}{2} \frac{n}{2}$$

Then,

$$M = \tfrac{1}{2} \frac{nd}{2} \times \tfrac{1}{2} \frac{n}{2} = \tfrac{1}{8} \left(\frac{n}{2}\right)^2 d$$

Example.—Arc 4 stations long on 4° curve.

$$\tfrac{1}{8} \times 2^2 \times 4 = 1\text{4 feet}$$

Arc .8 stations long on 10° curve.

$$\tfrac{1}{8} \times .4^2 \times 10 = 1.4 \text{ feet}$$

Error.—In above examples, .057 and .002.

6. On a d degree curve, to determine ordinates for 100 feet chords.

Formula.—

$$M = 0.22\, d$$

Deduced from formula 5.

Example.—Ordinate on 20° curve.

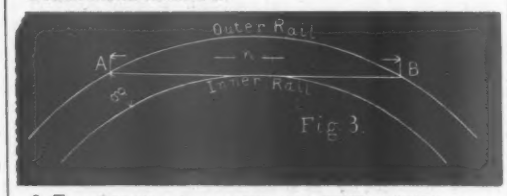
$$4.4 = 20 \times .22$$

Error.—Inappreciable in most instances. In above example, .026. Ordinates at quarter points, $\frac{1}{4}m$.

7. On d degree curve, ordinates for bending rails.

30 feet rails, $.08 \times d$
28 " " $\frac{1}{4} \times \frac{d}{10}$
26 " " $.06 \times d$
24 " " $.05 \times d$

Deduced from formula 5.



8. To determine the degree of a curve already in.

Measure the length of line AB, fig. 3, $= n$ stations, from outer rail to outer rail, on a line tangent to inner rail. Then, generally:

Formula.—

$$d = \frac{g}{\tfrac{1}{8} \left(\frac{n}{2}\right)^2}$$

or, for the common gauge of 4ft. 8½in.,

$$d = \frac{21.7}{n^2}$$

Demonstration.—Easily deduced from formula 5.

Example.—AB measures 270 feet. Then

$$2.7^2 = 7.29$$

21.7 divided by 7.29 = 3° curve evidently.

Error.—Inappreciable. The line AB should be measured in two or three places and averaged. The gauge was taken at 4.75 in computing constant 21.7.

9. Given two points x feet apart, to lay out a right angle with a tape.

Formula.—Hold at 2x and $\frac{1}{2}x$; or 3x and $\frac{1}{3}x$.

This is, of course, only the 3, 4 and 5 triangle in a form convenient to remember and apply.

10. On a d degree curve, given a number of equidistant points, to lay off with a tape, at each, normals to the curve (or lines perpendicular to the tangent).

Formula.—Hold as in formula 9, but adding to 2x, $\frac{1}{4}n^2d$; or to 3x, $2n^2d$, n being the decimal number of stations in x.

Example.—Points 15 feet apart on 6° curve. Hold, by formula 9, at 30 and 11.25, adding to 30, however, on account of curve,

$$\tfrac{1}{4} \times (15)^2 \times 6 = .11$$

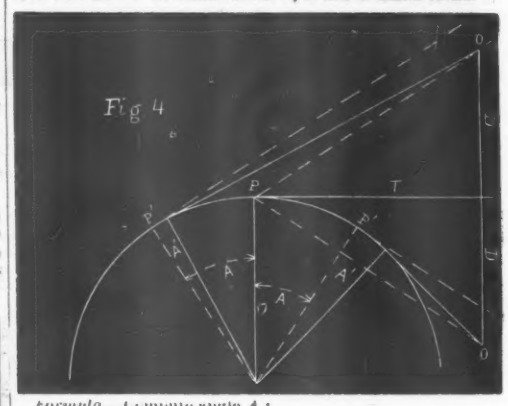
or, hold at 45 and 20, adding to 45,

$$2 \times (.15)^2 \times 6 = .27$$

Demonstration.—By Formula 4, the offset to any point from a tangent to the next point is $\frac{1}{4}\ n^2d$. By laying off one right angle from that point instead of the tangent, or right-angle stake, will be in error $\frac{1}{4}$ of $\frac{1}{4}\ n^2d$ in the first instance, or $\frac{1}{4}$ of $\frac{1}{4} n^2d$ in the second instance; equal to a distance *along the hypothenuse* of $\frac{2}{3} \times \frac{1}{4}\ n^2d = \frac{1}{6}\ n^2d$, in the first instance; or to a distance of $\frac{1}{3}$ of $\frac{1}{3} \times \frac{1}{4}\ n^2d = 2\ n^2d$, in the second.

Error.—Inappreciable.

11.—Having run in a d degree curve to a tangent T, Fig. 4, to change $T\ P$ to strike point O, D and T being given.



Formula.—Compute angle A;

$$\tan A = \frac{D}{T}.$$

Determine by it the length of curve to be added or subtracted $= \frac{A}{d} = N = n$ stations.

Then always run the curve the angle A' further.

$$\tan A' = \frac{\tfrac{1}{6}\ n^2 d}{T \pm N}.$$

Demonstration.—The angle A throws us into a tangent parallel with the line $P\ O$ and distant from it, by Formula 4, $\frac{1}{4}\ n^2d$; $\frac{1}{4}\ n^2d$ divided by distance $O\ P'$ gives us the tangent of A'; and $O\ P'$ does not essentially differ from $T \pm N$.

Example.—

$T = 1000$; $D = 100$; 3° curve; curve to be lengthened.

$$\tan A = \frac{100}{1000} = 5° 42' = \text{arc of } 1.9 \text{ stations.}$$

$$\tan A' = \frac{\tfrac{1}{6} \times 1.9^2 \times 3}{1000 - 90} = \frac{9.47}{8100} = .0117 = 40'.$$

$$A + A' = 6° 22'.$$

Same notes, curve to be shortened:

$A = 5° 42'$, as before.

$$\tan A' = \frac{\tfrac{1}{6} \times 1.9^2 \times 3}{1000 + 190} = \frac{9.47}{1190} = 0° 28'.$$

$$A - A' = 5° 14'.$$

Error.—In the first case, O; in the second about 1 minute. The error diminishes rapidly with D.

12.—To solve a right-angled triangle of small altitude, given the altitude and base.

Formula.—Square altitude, divide by twice the base. Add quotient to base for hypothenuse.

Example.—

Base 100, height 10. $\frac{10^2}{200} = .5$. Hypothenuse 100.5.

Hypothenuse 100, height 25. $\frac{25^2}{200} = 3.125$. Base 96 875.

Error.—In first example, .002; in last, .045.

This formula is very useful in chaining round obstruction, or on sloping ground, figuring length of batter posts, estimating increased length from a change of line in location, and many similar purposes. An example which comes to my mind may be found on page 404 of Trautwine's Pocket Book. He gives the following rule to find the middle ordinate of an arc: "From the square of the radius take the square of half the chord. Take the square root of the remainder. Subtract this square root from the radius." The same result to several decimals is given by the simple rule—square the half chord and divide by twice radius.

The origin of this formula may be found on page 85 of Henck.

13.—Lengths of Batter Posts.

Approximate Formulæ.—

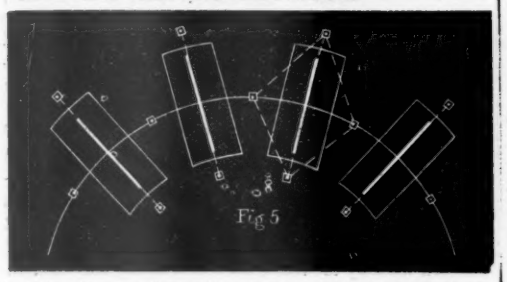
3 in. batter; $\frac{1}{20}$ longer than post.
4 in. batter; $\frac{1}{15}$ longer than post.
6 in. batter; $\frac{1}{10}$ longer than post.

Exact Formulæ.—

2½ in. batter; .02 longer than post.
3 in. batter; .0308 longer than post.

4 in. batter; .054 longer than post.
6 in. batter; .118 longer than post.
9 in. batter; ¼ longer than post.

14.—To stake out a trestle on a curve.



Rule.—Run in points *midway between* each bent. With the distance between them as a base, lay off with a tape isosceles triangles of an altitude = ½ length of sill + 1 foot. Set a grade for each bent, if on a grade, or every second bent if grade is level, marked + 2, +3, etc., showing the number of feet from top of stake to bottom of sill. This is all that is required for any trestle; but if workmen are untrustworthy set grades in the pit after excavation.

This latter rule is included, though not strictly pertinent to the subject, because a vast amount of labor is often needlessly expended in staking out trestles. The impulse of the natural man seems to lead him to run in points *at* the bents instead of *between* them; a greater absurdity can hardly be committed. Setting right-angle stakes with a transit, or staking the corners of the pits and marking cuts on them, all involve only useless labor, as a foreman who requires more than above is not fit for his position. The sills can be set without sensible error directly on a line between the center stakes, the only error being that the radius is shortened two or three hundredths.

A. M. Wellington.

Monroe, Mich., March 19, 1873.

Timber Piers for Wooden Bridges.

In an article on this subject, signed "W. M. J.," in the Railroad Gazette of March 29, bills of the materials were furnished by the writer, but were mislaid, and so could not be given with the cuts. We present them below with reference to the figures:

No. 1.—Pile Pier—Truss-Beam, 30 Feet Span. (Same arrangement is suitable for 50 feet Howe truss, by making distance between inside piles 12 feet instead of 9 feet, and wall plates 21 feet instead of 18 feet.)

Timber Bill for One Pier.

2 bolsters	12 x 12 in. x	7 feet.
2 plates,	12 x 12 in. x	18 feet.
4 caps,	12 x 12 in. x	6 feet.
9 piles,	22 feet long.	

No. 2.—Howe Truss, 80 Feet Span—Pile Pier.

Timber Bill for One Pier.

6 bolsters,	12 x 8 in x	8 feet.
2 plates,	12 x 12 in. x	21 feet.
4 caps,	12 x 12 in. x	7 feet.
13 piles,	22 feet long.	

No. 3.—Framed Pier, 80 Feet Span.

Timber Bill.

6 bolsters,	12 x 8 in. x	8 feet.
2 plates,	12 x 14 in. x	22 feet.
2 sills,	12 x 12 in. x	30 feet.
4 caps,	12 x 12 in. x	12 feet.
4 posts,	12 x 12 in. x	25 feet 2 in.
8 "	12 x 12 in. x	25 feet 6 in.
12 piles,	18 feet long.	

No. 4.—Framed Pier, Howe Truss, 150 Feet Span.

Timber Bill.

2 posts,	33 feet.	
4 "	33 feet 3 in.	
4 "	33 feet 5 in.	
8 "	33 feet 9 in.	
6 bolsters,	12 x 10 in. x	9 feet.
3 plates,	12 x 14 in. x	23 feet.
3 sills,	12 x 12 in. x	34 feet.
4 caps,	12 x 12 in. x	16 feet.
6 braces,	3 x 10 in. x	30 feet.
6 "	3 x 10 in. x	11 feet.
18 piles,	18 feet long.	

General Ticket Agents' Association.

The regular annual convention of the General Ticket and Passenger Agents' Association met at Washington on the 21st of March, 1873, and was called to order by the President, Mr. E. A. Ford, of the Atlantic & Pacific Railroad. Mr. Samuel Powell, of the Chicago, Burlington & Quincy Railroad, Secretary.

After some preliminary discussion in reference to the manner of organization, it was decided that the present convention was called under the new constitution, adopted at the last fall meeting of the Association in New York, and that the provisions of that constitution must be complied with—one of which is that each representative shall present credentials from his managing officer, as follows:

——————— Company, ———— 18—.

To the General Ticket and Passenger Agents' Association:

——— ——— ——— is hereby constituted the representative of the Passenger and Ticket Department of this company, at all meetings of the Association, and as such representative is vested with full power to act for and bind this company in making rates and divisions for the transportation of passengers and baggage, and the adoption of rules and regulations for the execution of the foregoing powers; and to act in such capacity until the above delegated authority is revoked, and notice of the same given to the Secretary of the Association.

(*Signature.*)

The Executive Committee, after examination, reported that the following persons had regular credentials, whereupon those delegates named signed the following:

"We hereby agree to accept the constitution and by-laws of the General Ticket and Passenger Agents' Association, and be bound by the requirements of the same."

Adirondack—C. E. Durkee.
Atchison & Nebraska—W. F. White.
Atchison, Topeka & Santa Fé—A. E. Touzalin.
Atlantic & Great Western—W. B. Shattuc.
Atlantic & Pacific—E. A. Ford.
Baltimore & Ohio—L. M. Cole.
Boston, Clinton & Fitchburg—Ed. A. Brown.
Burlington, Cedar Rapids & Minnesota—Charles J. Ives.
Burlington & Missouri River Railroad in Nebraska—G. O. Manchester.
Camden & Atlantic—D. M. Zimmerman.
Central Railroad of New Jersey—H. P. Baldwin.
Charlotte, Columbia & Augusta—E. R. Dorsey.
Chesapeake & Ohio—J. F. Netherland.
Chicago & Alton—James Charlton.
Chicago, Burlington & Quincy—Samuel Powell.
Chicago & Iowa—H. Starring.
Chicago, Milwaukee & St. Paul—A. V. H. Carpenter.
Chicago & Northwestern—W. A. Thrall.
Chicago, Rock Island & Pacific—E. St. John.
Delaware & Hudson Canal Company—S. E. Mayo.
Des Moines Valley—James Barker.
Detroit & Milwaukee—A. White.
Elizabethtown & Paducah—O. Brashear.
Erie—J. N. Abbott.
Georgia—J. A. Robert.
Great Western—W. Edgar.
Hannibal & St. Joseph—E. A. Parker.
Illinois Central—W. P. Johnson.
Indianapolis, Bloomington & Western—J. W. Brown.
Indianapolis, Cincinnati & Lafayette—C. K. Lord.
Jeffersonville, Madison & Indianapolis—A. Anderson.
Lake Shore & Michigan Southern—J. W. Cary.
Little Rock & Fort Smith—H. C. E. Costelle.
Louisville & Cincinnati United States Mail Line—James Ferrier.
Louisville, Nashville & Great Southern—W. H. King.
Marietta & Cincinnati—J. W. Pillsbury.
Marietta & Pittsburgh—J. A. Kingsbury.
Memphis & Little Rock—J. H. Perry.
Missouri, Kansas & Texas—J. D. Brown.
Nashville, Chattanooga & St. Louis—W. L. Danley.
New Orleans, Jackson & Great Northern, Mississippi Central, and Mississippi & Tennessee—S. E. Carey.
Northern Central—E. S. Young.
Northeastern—P. L. Cleapor.
Northern Pacific—G. G. Sanborn.
North Pennsylvania—Ellis Clark.
Northwestern Stage Company—C. C. Huntley.
Ohio & Mississippi—R. T. Brydon.
Orange, Alexandria & Manassas—J. M. Broadus.
Pennsylvania—D. M. Boyd, Jr.
Philadelphia & Reading—C. G. Hancock.
Philadelphia, Wilmington & Baltimore—G. A. Dadmun.
Pennsylvania Company—F. R. Myers.
Raleigh & Gaston—Thomas Badger.
Rockford, Rock Island & St. Louis—T. Penfield.
St. Louis & Iron Mountain—W. R. Allen.
St. Louis, Vandalia, Terre Haute & Indianapolis—Charles E. Follett.
South Carolina—S. B. Pickens.
Toledo, Peoria & Warsaw—H. C. Townsend.
Union Pacific—Thomas L. Kimball.
Vermont & Massachusetts—G. Lawrence.
Western & Atlantic—B. W. Wrenn.
Wilmington & Weldon, and Wilmington, Columbia & Augusta—A. Pope.

Having complied with the requirements of the constitution they became members of the Association.

Several delegates were present without the required credentials, and the Executive Committee recommended that they be admitted as members, with the understanding that they would present their credentials at the next meeting. The President decided that they were acting under the new constitution, and that being the case that portion of the report of the Committee recommending that delegates be admitted without the credentials required in the constitution could not be entertained.

Mr. Carpenter introduced a resolution, which was adopted, allowing delegates without the required credentials seats in the Convention, and the same privileges as honorary members.

The Convention then proceeded to the election of officers for the coming year, which resulted as follows:

President—E. R. Dorsey, of the Charlotte, Columbia & Augusta Railroad.

Vice-President—Thos. L. Kimball of the Union Pacific Railroad.

Secretary—Samuel Powell, of the Chicago, Burlington & Quincy Railroad.

The following Executive Committee was chosen: Messrs. W. L. Danley, Nashville Chattanooga & St. Louis Railroad, for long term (three years); Ellis Clark, North Pennsylvania Railroad, intermediate term (two years); W. A. Thrall, Chicago & Northwestern Railway, for short term (one year).

Chicago was selected as the place for holding the next meeting.

The committee to whom was referred the revision of by-laws reported the following code:

BY-LAWS.

Section 1. The annual convention shall be held on the last Friday but one in March, and the semi-annual convention on the last Friday but one in September, in each year, at 11 o'clock a. m., unless dispensed with by vote of the Association, at a special meeting called for that purpose within thirty days preceding the time of holding either of said conventions as herein specified. And it shall be the duty of the Secretary to give ten days' notice to the members of the Association of the time and place of holding the regular conventions.

Sec. 2. Special meetings may be held by order of the Executive Committee, or upon the application of fifteen members of the Association to the President, stating the place and object for holding the same. It shall be the duty of the President, within five days after receiving the order of the Executive Committee, or application aforesaid, to call a special meeting in accordance therewith, giving ten days' notice of the time, place and purpose thereof to each member of the Association, a copy of which order shall be filed with the Secretary as soon as issued. And if any such special meeting is called for the purpose of dispensing with either annual or semi-annual convention, as provided in Section 1, a three-fourths vote of the members present shall be required to so order; and upon such decision being made, the regular business for such convention, as provided in the constitution, shall then be proceeded with at such meeting, and have the same effect as if done at the regular time and place for holding the same.

Sec. 3. The convention shall be called to order promptly at the hour named in Section 1, by the President, and the Secretary shall call the roll of members. If a quorum shall be declared present, the convention shall immediately proceed to business. If no quorum shall be present, those assembled may adjourn, not to exceed twenty-four hours, at the expiration of which time, if no quorum is present, the convention shall be adjourned *sine die*.

Sec. 4. The order of business shall be as follows:

1st. Record of members present.
2d. Enrollment of new members.
3d. Election of officers.
4th. Locating next meeting.
5th. Unfinished business.
6th. Consideration of the report of Executive Committee and miscellaneous business.
7th. Making passenger rates.

Sec. 6. Reports of committees and resolutions offered for consideration shall always be in writing; and, on request of Chairman or any member the maker of any motion shall reduce the same to writing before it shall be entertained.

Sec. 6. The proceedings of conventions shall be conducted according to the rules in Cushing's Manual, so far as applicable.

Sec. 7. 1st. Passenger rates shall be fixed in open convention.

2d. The right to make through rates between common points shall be accorded to the company or companies having the shortest line between said points: *Provided*, That the computation of distance shall be made by the usual route over which through tickets are regularly sold and trains run in connection; *And provided further*, That when a water route forms part of such line, and is in competition with a rail line, then the rates of the rail line shall be adopted in making the through rate: *Provided*, That such through rate shall not exceed the sum of the locals of any rail line between such points.

3d. The rates, when established, shall have the force of a contract, and for any violation thereof by any company, whether constituents of this Association or not, the aggrieved party shall have the following remedy:

Upon complaint by letter or telegraph to the President (or, in case he is a party in interest, to the Vice-President), he shall appoint a committee of five disinterested members of the Association who can be most readily convened, naming the time and place of meeting of such committee and its chairman, and cite the parties at issue through their representative of the passenger department to appear before such committee at said time and place. After hearing the allegations and proofs of the parties, a majority of the committee shall decide the question at issue and render judgment. If the judgment is against the party complained of, the committee may recommend either of the following penalties: Reprimand, censure, suspension, or expulsion of the representative of the offending line from the Association, if he be a member thereof, or a suspension of interchange of passenger traffic by all lines constituents of this Association with the offending line, for such time as the committee shall adjudge. In case of either of the four first penalties being recommended, the committee shall certify their action to the Secretary of the Association, by whom it shall be presented to the Association at its next regular meeting for approval, and if so approved the sentence shall be carried into effect according to the recommendation of the committee; or the same may be modified in accordance with the sense of the majority of the Association.

4th. If the recommendation shall be suspension of business, as hereinbefore provided, the several members of the committee shall each take a transcript of the charges and evidence, with their recommendation, to his general manager or general superintendent, and if approved by the majority of such managing officers the members of the committee shall forward such approvals to the Secretary of the Association, who shall forthwith issue a circular to all the constituents of the Association, reciting the charges, judgment and approval, and requiring all such lines to comply therewith under penalty of being subject to a like suspension of passenger traffic upon conviction thereof, after trial conducted and approved as herein provided.

5th. If the party complained of shall neglect or refuse to appear before the committee in obedience to the citation, the committee may proceed *ex parte*.

6th. In case the prosecuting party shall fail to substantiate his charge to the satisfaction of the committee aforesaid, he shall be subject to either of the four first-named penalties, as the Association shall, upon certificate of the majority of the committee that such prosecution was without probable cause, or appears to be instigated by mischievous intentions, see fit to inflict.

7th. It is further provided, that in case one or two members of the committee (specified in Clause 3) shall be absent at the time appointed for hearing, the other members may fill the vacancies or proceed to hear and determine the case. If four members proceed, as herein provided, it shall require the concurrence of three to convict. If less than three members shall be present, those present may adjourn from time to time till a quorum is obtained.

[There being a desire on the part of some members to submit that portion of Section 7 embraced in 3d, 4th, 5th and 6th clauses to the general managers, it was

Resolved, That so much of Section 7, commencing with Clause 3, to the end of the section, be adopted, subject to the approval of a majority of the managing officers of the constituents of this Association. Adopted—ayes 40, noes 1.]

Sec. 8. The Association may admit, as honorary members, retired general ticket and passenger agents; such honorary members shall be entitled to seats in the conventions of the Association, and may, upon invitation and unanimous consent, participate in debate.

Sec. 9. None but the regular representatives, *ex officio* and honorary members of the Association shall be present at any convention of same, or at the meeting of any committee thereof: *Provided*, That by general consent the President may invite visitors to seats at any meeting of the Association.

Sec. 10. No proposition, invitation or resolution that does not pertain to the legitimate business of the Association shall be entertained, except by unanimous vote.

Sec. 11. Whenever changes are made in the heads of the representative, ticket, or accounting departments of any road, it shall be the duty of the representative of such road to give immediate notice to the editor of the *Official Railway Guide* for publication.

Sec. 12. Any member appointed on a committee shall serve unless excused by the convention.

Sec. 13. These by-laws may be altered, amended or repealed at any regular meeting of the Association, by a vote of two-thirds of the members present.

All former by-laws are hereby repealed.

All which is respectfully submitted.

A. V. H. Carpenter,
Thos. L. Kimball,
F. R. Myers,
} *Committee.*

The report of the committee was adopted, subject to the following resolution, offered by D. M. Boyd, Jr.:

Resolved, That the Secretary be instructed to print the new by-laws immediately, and distribute the same to members of the Association at this meeting, who are requested to submit it to their respective managers at the earliest practicable moment for approval or disapproval of Section 7, and shall at once notify the Secretary of such decision in writing. In the event of the approval of said Section 7 by a majority of the managers of the constituent lines of the Association, the Secretary shall issue a circular, giving notice that said section is thereafter in full force and effect.

Samuel Powell, *Secretary.*

Washington, D. C., March 22, 1873.

THE SCRAP HEAP.

Experience with Steel-Topped Rails.

The Springfield *Republican*, of March 25, says: "The German steel rails laid as an experiment, last fall, for two miles east of this city on the Boston & Albany Railroad, are not working very well. The steel top fits into the iron bottom somewhat wedge-fashion, and the weight of the trains is crushing out the iron."

Wendt's Torsion Car Spring.

Wendt, the Chief Locomotive Engineer of the Berlin & Gorlitz Railroad, has obtained a patent for a car spring which depends upon torsion instead of flexion, as in the ordinary plate springs, and which, it is claimed, is less liable to break, gives greater security, with 20 per cent. heavier load, is cheaper, and is easily attached to the car.

RAILROAD GAZETTE

Published Every Saturday.

A. N. KELLOGG & CO., *Proprietors.*

S. WRIGHT DUNNING AND M. N. FORNEY, *Editors.*

CONTENTS.

Editorial Announcements.

Removals.—*The Chicago office of the* RAILROAD GAZETTE *has been removed to No. 77 Jackson street, opposite Third avenue.*

The New York office of the RAILROAD GAZETTE *will be at Room* 131, *No. 73 Broadway, opposite the upper elevator landing, on and after April* 14.

Correspondence.—*We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.*

Articles.—*We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.*

Inventions.—*No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

CHICAGO GRAIN TRAFFIC.

The grain traffic of Chicago forms an interesting subject of study in connection with the routes of transportation to and from the city. As the receipts, including flour calculated at the rate of 4½ bushels per barrel, were no less than 88,426,849 bushels—that is about 225,000 car loads—it is evident that this is an item of traffic of the very highest importance. And so far as receipts are concerned the railroads get the most of this traffic, though the Illinois & Michigan Canal brought in a little more than 8,000,000 bushels in 1872, or one-eleventh of the whole—seven-eighths of it corn. Of the remaining 80,000,000 bushels carried by the railroads into the city, the Chicago & Northwestern moved 21,800,000, the Illinois Central, 16,450,000; the Chicago, Burlington & Quincy, 18,500,000; the Chicago, Rock Island & Pacific, 13,000,000; the Chicago & Alton, 7,700,000; the Chicago, Danville & Vincennes, 2,200,000; while the four roads to the East altogether brought in less than 400,000 bushels.

The Northwestern is the great wheat route, having in 1872 brought in two-thirds of all the flour and more than half of the wheat, while these two formed more than half of its grain tonnage. No other line brought in so little corn, though it greatly exceeded all others in mileage. But its southern line marks pretty nearly the northern border of the corn exporting district. On the contrary, the lines farther south export comparatively little wheat, the total carried by all, including flour, being little more than the corn carried by any one of them; and all the rest are great corn carriers, and none distinguished very much over its neighbors, mileage considered, in this staple, the Chicago, Burlington & Quincy leading with nearly 12,000,000 bushels, the Illinois Central reporting 8,000,000, the Chicago, Rock Island & Pacific 7,500,000, and the Chicago & Alton 6,500,000, while the new and short line of the Chicago, Danville & Vincennes brought in 1,500,000 bushels.

The following table gives the percentage of the total receipts at Chicago of each grain received by each route:

	Flour.	Wheat.	Corn.	Oats.	Rye.	Barley.
Chicago & Northwest'n	67.06	51.92	9.31	22.45	29.75	47.672
Chicago, Bur. & Quincy	7.42	7.95	21.92	26.01	29.94	18.11
Chicago, R. I. & Pacific	6.18	14.09	16.10	14.83	21.65	13.30
Chicago & Alton	4.38	.20	13.98	4.65	4.98	.25
Illinois Central	10.02	23.24	17.16	23.10	11.59	20.211
Chi., Dan. & Vincennes	.06	.05	3.41	3.60	1.65	.23
Lake	1.19	1.31	....	....	....	.125
Canal	1.15	.04	15.11	5.65	.36	.0012
Michigan Central	1.36	.11	....	.13	...	....
L. Sh. & Mich. South'n	.93	.90	.00005	..	.05	....
Pittsb., Ft. W. & Chic.	.22	.04	.00225	.02	.03	....
Pittsb., Cinc. & St. Lou.	.03	.16	.0077	.09	....	.0108
	100.00	100.00	100.00	100 00	100.00	100.00

In the following table we have calculated the tonnage of grain and flour carried by each road to Chicago, with the percentage of the total receipts at Chicago carried by each route. As the traffic is very nearly or quite in proportion to the weight of grain, this serves to give the best idea of the amount of business which each line obtains from the grain traffic. The number of car-loads is about equal to one-tenth of the tonnage:

	Grain, tonnage.	Per cent. of total.
Chicago & Northwestern	549,543	24.40
Chicago, Burlington & Quincy	457,108	20.32
Illinois Central	417,005	18.52
Chicago, Rock Island & Pacific	334 998	14.88
Illinois & Michi. an Canal	216 035	9.59
Chicago & Alton	205,810	9.14
Chicago, Danville & Vincennes	54,870	2.44
Lake	6,868	.30
Lake Shore & Michigan Southern	4,865	.22
Michigan Central	2,829	.12
Pittsburgh, Cincinnati & St. Louis	1,007	.045
Pittsburgh, Fort Wayne & Chicago	597	.025
	2,251,535	100 00

We have heretofore called attention to the fact that the grain traffic of Chicago is supplied entirely by the country west of it. How true this is is shown by the table, by which we see that six railroads first named, together with the canal, brought to the city more than 96 per cent. of the flour, 98½ per cent. of the wheat, 99.99 per cent. of the corn, 99½ per cent. of the oats, rye and barley. The Northwestern is beyond comparison the great flour and wheat route, bringing in two-thirds of the former and more than half of the latter. Only three other roads—the Illinois Central, the Rock Island and the Burlington & Quincy—brought in considerable quantities of wheat. Compared with the mileage, as we have said, the Northwestern is a very light corn carrier, and all the other western routes heavy ones; but a comparison by mileage is not always just, as some lines carry very little except the productions of the country on their own lines, while others serve as outlets for systems of roads quite as extensive as their own mileage.

In the table of grain tonnage the routes are arranged according to the amount of their grain traffic, and the percentages show their exact rank as carriers of grain to Chicago in 1872. This is not in all cases the measure of their rank as grain carriers, for a large part of the northward shipments over the Chicago & Alton and the Illinois Central leave those lines by the Joliet cut-off, while they carry southward very largely; and a considerable quantity of grain leaves the Chicago, Burlington & Quincy at Peoria, not going to or through Chicago.

When we consider the shipments, as we do in the tables below which we have calculated for this purpose, the most striking feature is the overwhelming importance of the lake route. As the second table shows, just three-fourths of the flour and grain tonnage went east by water, and all the railroads together carried but one-quarter of it away from Chicago. This, however, is an unusually large proportion, and indicates a great growth in this traffic, which was only a few years ago very light indeed. The following gives the percentage of shipments of flour and each kind of grain by each route:

	Flour.	Wheat.	Corn.	Oats.	Rye.	Barley.
Lake	16.44	72.66	88.47	51.99	29.81	46.31
Pittsb., Fort Wayne & Chic.	34.65	4.48	2.54	6.23	23.80	18.83
Pittsb., Cin. & St. Louis	17.34	4.63	.32	4.00	33.90	7.08
Michigan Central	13.38	6.87	4.38	24.09	2.42	11.11
Lake Shore & Mich. South'n	9.73	3.50	4.22	13.43	5.80	11.87
Illinois Central	2.91	.92	....	.01	1.01	1.37
Chicago & Northwestern	1.57	.98	.06	.16	.13	.90
Chicago, Danv. & Vincennes	1.55	.71	....	.01	1.13	.17
Chicago & Alton	1.07	1.22	....	.01	1.63	1.14
Chic., Rock Island & Pacific	.73	1.68	.01	.01	.32	1.00
Chic., Burlington & Quincy	.54	.65	....	....	...	.27
Illinois & Michigan Canal	.09	1.70	....	.06	.05	....
	100.00	100.00	100.00	100.00	100.00	100.00

The grain tonnage shipped by each route and its percentage of the total grain shipments are shown below.

	Tonnage.	Per cent
Lake	1,617,792	75.00
Michigan Central	162,795	7.55
Pittsburgh, Fort Wayne & Chicago	137,679	6.38
Lake Shore & Michigan Southern	123,531	5.72
Pittsburgh, Cincinnati & St. Louis	66,673	3.09
Illinois Central	9,239	.43
Chicago, Rock Island & Pacific	8,579	.40
Chicago & Alton	7,977	.37
Chicago & Northwestern	7,957	.37
Illinois & Michigan Canal	6 423	.29
Chicago, Danville & Vincennes	5,188	.24
Chicago, Burlington & Quincy	3,494	.16
Total	2,157,326	100.00

Flour has long gone chiefly by rail. Five-sixths of it the table shows went by those routes in 1872, and more than one-half of it by the two lines to Pittsburgh which the Pennsylvania Company works, while the two other Eastern lines carried less than a quarter of it. Wheat, being more valuable in proportion to its weight than the other grains, we might expect to largely choose the rail routes, and, indeed, more than twice as large a proportion as of corn was shipped by rail, though not much more than half as many bushels. A much larger proportion of the other grains—nearly one-half of the oats, 70 per cent. of the rye, and considerably more than one-half of the barley—went by rail; probably because these grains were largely consumed at points along the roads and so far south as to be not reached conveniently from the lakes. More than seven-eighths of the corn went by the lakes, notwithstanding the lack of vessels, and it is evident that to provide for the carriage of all or the greater part of this staple by rail would require an immense increase in equipment, as the lake shipments would have made more than 100,000 car loads. The total grain shipments by lake were equivalent to 160,000 full car loads, and would have required the dispatch of five or six thousand additional trains, or about twenty daily, from Chicago eastward. The existing roads could readily be made equal to such an addition of traffic—indeed, except in equipment, they will probably be prepared for a greater addition by the end of the season; but it would be much more difficult and probably more costly to provide the requisite facilities for disposing of the freight after it had been carried, the terminal facilities, especially in New York, being utterly inadequate for the present traffic.

The report of the Chicago Board of Trade for the year 1872 has supplied us with the data from which we have calculated the above tables.

The General Railroad Law in New Jersey.

The enactment of a general railroad law in New Jersey has been made to appear, and really is, a measure of importance, but has attracted general attention throughout the country more on account of the desperate struggle over it than the nature of the measure itself. There have been a great many wild utterances over the probable effect of such a law, and bitter and unsparing denunciations of the company which held the monopoly which the State itself made and for many years maintained in spite of the complaint of the rest of the country, including most railroad corporations outside of New Jersey. We have seen an elaborate article purporting to show that railroad facilities have increased much less rapidly in New Jersey than in other Eastern States, because of the difficulty of getting authority to construct them; the fact being that there never has been any difficulty in getting charters for roads anywhere in the State except for the 90 miles between New York and Philadelphia; that charters exist or have existed for lines of almost every imaginable kind except this one, and that in reality the rate of increase of railroad mileage in New Jersey has been more and not less rapid than in most of its neighbors. There were enough valid arguments in favor of a general law to make such shams particularly inappropriate.

The Pennsylvania Railroad Company has received its full share of condemnation for opposing the law, though the circumstances of the case give abundant reason for its position, whatever may have been the impolicy of the State's yielding to it. The monopoly was not the creation of the Pennsylvania Railroad Company, but was older than that company, and had been one of the obstacles in the way of its legitimate completion of its line and economical management of its business. It wanted and needed a line from Philadelphia to New York, and if we mistake not it tried hard to secure one before it attempted to lease the New Jersey roads. But such a line was not to be had by it, as it was beyond the reach of all who had tried before it. Then when, as the only way to secure the needed connection to New York in its own hands, negotiations were had for the lease of the monopoly's lines, the fact of the monopoly and of the assumed permanency of that monopoly was made to increase the amount of rental, which was fixed at a rate which required *an increase* of traffic to make the net earnings equal to it. They have not so far equaled the rental; and though the traffic which the Pennsylvania can absolutely control—which is immense and growing—may at some time afford sufficient profits to pay the rental, or more, that time will doubtless be postponed to a later date than otherwise by the completion of one or more competing lines. It is not at all strange that the Pennsylvania should try to keep the property which it supposed it had leased and which it is bound to pay for—that is, the monopoly of the railroad traffic between New York and Philadelphia. The lessors had hardly leased their property, at the highest possible rate, when one of its essential qualities which made it most desirable suddenly disappeared.

It is noticeable that the National Company was quite as much opposed to a general law as its rival which had so successfully opposed it, the fact being that an exclusive charter for a railroad between New York and Philadelphia would be a very valuable—and salable—property; while a right shared equally by all who can raise money enough is one of the treasures like the air we breathe—inestimable, but too common to bear a price.

Whether any railroad, or more than one, will be constructed, under this new law, between Philadelphia and New York remains to be seen. The Baltimore & Ohio, one would think, would be eager to provide itself a connection with the metropolis; but that company is not always very active, and it is not yet sure of its way across Pennsylvania. Probably no com-

pany would be quite safe in making such a road unless it had the assurance of the through traffic of lines or systems of lines west of the Delaware; but some of the Northern New Jersey lines might easily find it profitable to complete branches which would enable them to do Philadelphia business. The National Company filed articles of incorporation under the general law as soon as it was signed, and announces its purpose to have its road completed before another session of the Legislature. An obstacle almost as formidable as the late difficulty of getting a charter is the difficulty of securing suitable and sufficient terminal facilities at Jersey City, where not only is such property very dear, but most of what is available is already in the hands of railroad companies, none of whom have any to spare or would let it go without a struggle if they could spare it.

Some journals speak of New Jersey as the first State to enact a general railroad law—which is very far indeed from the truth. Maine and Vermont passed such laws last winter, and Massachusetts a year ago. Illinois, Indiana and Ohio have such laws, and so indeed has Pennsylvania, though the latter is sometimes called a law to prevent the incorporation of railroad companies. Minnesota, we believe, has a similar law, and so doubtless have other States. Others would have them, doubtless, but for the fact that an old charter may be had for a trifle, perhaps with some "exceptional privileges," for almost any possible line.

The New Jersey law, as passed (a very full abstract of which, carefully compiled from an official copy, we present elsewhere), apparently is sufficient to authorize the construction of any number of new railroads between New York and Philadelphia, or elsewhere in New Jersey, by any who can comply with the not very exacting requirements of the law.

Annual Conventions.

The following societies will hold their annual conventions at the time and places named:

The American Railway Master Mechanics' Association, in Baltimore, beginning May 13.

The Railway Association of America, at the St. Nicholas Hotel, in New York, on the 14th and 15th of May.

The American Society of Civil Engineers, on the 21st and 22d of May, in Louisville.

The Master Car Builders' Association, on the 11th, 12th and 13th of June, in Boston.

Particular attention is called to the Master Mechanics' meeting, which we have heretofore announced as beginning May 6, as was announced also on the cover of the report of the last convention.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE gives information of the completion of track on new lines, as follows:

Colorado Central.—This line of 3-feet gauge has been extended for 6 miles beyond Black Hawk, to a point 25 miles beyond Golden. *Atlanta & Richmond Air Line.*—The Western Division has been extended 10 miles, to a point 86 miles east of Atlanta.

This is a total of 16 miles of new railroad.

THE ILLINOIS FARMERS' CONVENTION, held at Springfield on the 2d and 3d instant, was favored by addresses by Governor Beveridge and by his predecessor, ex-Governor Palmer. Both of these assumed that the railroad companies make extortionate charges, and seemed to consider as proof of extortion the fact that it costs more to ship a bushel of corn from Central Illinois to New York than it is worth in Central Illinois. This argument, if such it can be called, must rest on the assumption that the farmer has a right to a guaranty of a profitable price for his corn, and that if the consumer won't pay such a price the carriers must make it up. If this applies to the farmers of Illinois, should it not also to those of Colorado, Utah, etc., the price of whose wheat, not to say corn, would be eaten up two or three times by freight before reaching a market? And must this principle apply to any amount of production? For if farmers can be guaranteed profitable prices there will be hardly any limit to the grain production of this country, and we can easily conceive that it might in time exceed the capacity of the world to consume. In none of the current discussions do we see any hint at over-production as a possibility; but we are led to suppose that a sudden great increase in the cost of railroad transportation has within a year brought down the price of grain on the western farms; the fact being that there has been generally and almost everywhere in the West a *reduction* in the prices of transportation, that this reduction continued nearly all the time since the war, and that it has been on most lines very large, and on the whole much larger than the reduction in the price of any other service or staple largely and generally used. This is not due to any peculiar generosity on the part of the railroad companies, but solely to the operation of economical laws and improvements in transportation. At the close of the war, the cost of transportation from Chicago and points further west to the East was so great that scarcely any grain of any kind was carried east by rail. It went almost wholly to the nearest lake ports, and was carried thence by vessels during the season of navigation. In 1872, about 18,000,000 bushels of grain went east by rail from Chicago alone, while the shipments by lines which enter the State south of Chicago must have been very much larger. But the progress of the grain traffic by rail to that extent that last year 21¼ per cent. of the shipments eastward from Chicago were made in cars instead of vessels has been made possible by the cheapening of transportation by the rail route. Now even the cheaper grains go by rail largely, and a beginning has been made in this traffic which may result in an entire modification of the grain business, rendering it less dependent upon the season of navigation and the supply of lake vessels.

THE INSTABILITY OF RAILROAD PROPERTY was a subject of comment by ex-Governor Palmer, of Illinois, at the Farmers' Convention in Springfield on the 2d inst., who is reported to have said that "the management of the railways of Illinois is practically carried on outside of the State. It is controlled by the persons in Wall street who buy and sell the stocks;" meaning, evidently, that as a rule the railroads of Illinois are controlled by men who make a business of speculating in their stocks. The Governor in saying this only shared in a mistake which is very common East and West. Of the thirty or more railroad companies of Illinois, we believe that not more than seven or eight have had their stocks admitted on the Stock Exchange—which means that there are so few dealings in their shares, legitimate or speculative, that it has not been thought worth the while to have them admitted for quotation. Of those which are admitted, four may be called speculative stocks—that is, they are dealt in for speculation rather than investment, and are subject to combinations, "corners," etc. But only a small part of the mileage of the State is in the slightest degree liable to any influences from speculators, and, of course, there may be the wildest speculation in stocks without any change whatever in the management of the properties consequent upon such speculation. It is doubtless true that when managers speculate their management is likely to be affected by their speculations, and we may be justified in suspecting the stability and soundness of the administration of a property which changes hands frequently, and is not, to a large extent at least, held by those who look to it as a regular and steady source of income through the net earnings from its traffic economically conducted.

MONTREAL is preparing to do its full share of the grain exporting this year, and has nine propellers, four of them new, to run to and from Chicago. If its business increases as it has done lately, that city will soon become the port of the upper lake cities, so far at least as grain exports are concerned. This, however, is not "revolutionizing the grain business," as some may hastily conclude, for by far the largest part of the grain shipped from the Northwest is not exported at all.

Train Accidents in March.

We have information of 112 train accidents in the month of March last, which we report as follows:

Early on the morning of the 2d, near Merztown, Pa., on the East Pennsylvania Railroad, as an oil train was running down a steep grade, a truck broke, the car went down and was broken, the oil caught fire and thirteen cars were burned.

About 8 o'clock on the morning of the 3d, a car on the eastbound mail train on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad was thrown from the track near Rockaway, N. J., by the breaking of a truck. Little damage was done, but the train was delayed about two hours.

On the morning of the 3d, south of Augusta station, Ill., on the Chicago, Burlington & Quincy Railroad, a flat car of a north-bound freight train jumped the track and threw off several of the following cars, disabling some of them.

On the 3d, three coaches of a passenger train on the Cincinnati, Hamilton & Indianapolis Railroad (late Indianapolis Junction) were wrecked by a broken rail and two passengers injured—one severely.

On the 3d, on the Peoria & Galesburg Branch of the Chicago, Burlington & Quincy Railroad, two cars of a west-bound passenger train were thrown from the track.

On the afternoon of the 3d, near Yantic, Conn., on the New London Northern Railroad, there was a collision between up and down freight trains, by which both engines and twenty-five cars were wrecked. The telegraphic report says that "both trains were behind time and had received instructions from different parties to proceed."

On the night of the 3d, near Fredonia, Iowa, on the Southwestern Division of the Chicago, Rock Island & Pacific Railroad, the sleeping-car of a west-bound express train was thrown from the track by a broken rail, and landed on its side across a deep ditch. One sleeper was shot through a window into the bottom of the ditch, but no one was hurt worth notice.

On the night of the 3d, at Van Dyne, Wis., on the Wisconsin Division of the Chicago & Northwestern Railway, a north-bound passenger train, while running about 15 miles an hour, encountered a broken rail and went over a bridge about six feet high, and, with the exception of the engine, landed on its side. One passenger was killed.

On the morning of the 4th, shortly after midnight, near Spruce Creek, on the Pennsylvania Railroad, one stock train ran into the rear of another which was halting just before it, driving the caboose into the stock car next ahead, setting fire to the caboose from the head-light, and burning a drover who was caught fast in it.

On the forenoon of the 4th, three engines and a snow plow of the morning train from Bangor ran off the track near Pittsfield, Me., on the Maine Central Railroad, and two of the engines were badly smashed.

On the 4th, near Calumet, Ill., on the Lake Shore & Michigan Southern Railway, the rear coach of an accommodation train was thrown from the track by a broken rail.

On the 4th, near Tivoli, N. Y., on the New York Central & Hudson River Railroad, an up express train, finding the up track blocked by a freight train, was switched upon the down track to move round the freight. Signals were set half a mile north to arrest a down express then due, but they were not seen, as there was a blinding snow at the time, and the down express came upon the other as it was backing to its proper track. The tender of the engine of the up train (which was backing slowly) went half way through the mail car, and the engine and tender of the down train were almost doubled up. The fireman of the down train was killed in jumping, and the engineman badly bruised.

On the afternoon of the 4th, about 12 miles west of Cincinnati, on the Indianapolis, Cincinnati & Lafayette Railroad, there was a collision between east and west-bound freight trains, by which both engines were ruined and seven loaded freight cars burned.

On the night of the 4th, near Chelsea, Iowa, on the Chicago & Northwestern Railway, a west-bound express train was thrown from the track by a broken rail, and three persons were seriously injured, one dangerously.

On the morning of the 5th, at the Wild Cat Bridge, near Lafayette, Ind., on the Toledo, Wabash & Western Railway, a rail on the bridge broke under an east-bound freight train and the caboose car was thrown over the bridge down 50 feet to the stream below, and the conductor was killed and two brakemen were dangerously hurt.

On the morning of the 5th, near Willow Grove Station, Pa., 17 miles west of Pittsburgh, on the Pittsburgh, Cincinnati & St. Louis Railway, three sleeping cars of a west-bound express train were thrown from the track and down a bank 16 feet high by a broken rail, and were badly wrecked. Seven passengers were injured, one of them seriously.

On the 5th, near New Cumberland, Pa., on the Northern Central Railway, an axle broke under the express car of a north-bound passenger train, causing the telescoping of the second car behind at both ends, while the following car went down the bank. Three passengers were injured.

On the night of the 5th, four miles east of Altoona, on the Pennsylvania Railroad, a freight train ran into an engine which was standing on a siding and threw it off the track, killing the engineman and fireman who were on it.

On the night of the 5th, about 12 miles south of Harrisburg, Pa., on the Northern Central Railway, two coaches of a north-bound passenger train were thrown from the track, one against a hill and the other into the ditch, by a broken rail, and three passengers were hurt.

Early on the morning of the 6th, the tender of an express freight train bound east, on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad, was thrown from the track by the breaking of an axle.

On the morning of the 6th, a north-bound freight train on the Mississippi & Tennessee Railroad jumped the track near Sardis, Miss., injuring the conductor.

On the morning of the 6th, near Grand Crossing, Minn., on the Southern Minnesota Railroad, the track spread, over some defective piling, and two cars dropped down upon the trestles.

On the 6th, an ore train on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad ran off the track near Broadway, N. J., wrecking a number of cars.

On the afternoon of the 7th, a locomotive on the Bloomfield Branch of the Delaware, Lackawanna & Western Railroad ran off the track at Montclair, N. J., doing little or no damage.

On the afternoon of the 6th, the tire of one of the driving wheels of the locomotive of the Easton Express bound west on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad broke while the train was near Port Oram, N. J., delaying the train some time, but doing no serious damage.

On the morning of the 7th, a mile and a half east of Galena, Ill., on the Illinois Central Railroad, a freight train going in one direction and a pushing engine moving in the other met violently, knocking one of the engines across the track and wrecking both engines and several cars.

On the 7th, a broken tender wheel caused the wrecking of a west-bound mail train on the Baltimore & Ohio Railroad near Keystone Junction, the engine being thrown flat upon the track.

On the night of the 7th, four cars of a west-bound freight train on the Illinois Central Railroad were thrown into the ditch by a broken rail, near Julien, Ill.

On the 8th, near Brooklyn, Pa., on the Waynesburg Branch of the Pennsylvania Railroad, a mixed train was thrown from the track and down a bank by a broken rail, and the passenger car caught fire. Three passengers were injured.

On the afternoon of the 8th, near East Putney, Vt., on the Vermont Valley Railroad, the engine and tender of a north-bound passenger train jumped the track, and in this condition the train ran a quarter of a mile, the passenger cars remaining on the track.

On the evening of the 8th, at the junction in Lockport, on the New York Central & Hudson River Railroad, there was a collision between two freight trains, by which one engine and four or five cars were wrecked.

On the night of the 8th, at Zenia Crossing, O., an Atlantic & Great Western switch engine with three freight cars jumped the track at a frog, delaying trains on three roads for three hours.

On the night of the 8th, a south-bound freight train on the New York Central & Hudson River Railroad ran into the rear of a mixed way train at Barrytown, N. Y., and threw four cars from the track, blocking both tracks.

On the morning of the 9th, near Rattling Run, Pa., on the Northern Central Railway, the express car, postal car and baggage car of a south-bound express train were thrown down an embankment and broken up. The cause is reported to have been "something giving way under the express car."

On the morning of the 9th, near Live Oak, Fla., an east-bound passenger train on the Jacksonville, Pensacola & Mobile Railroad was thrown from the track by a broken rail, and one person was slightly injured.

Early in the morning on the 10th, at Brenford, on the Delaware Railroad, a freight train ran into an empty freight car which had blown from a siding upon the main track during the night, entirely destroying the car and damaging the engine a little.

About 3 o'clock in the morning on the 10th, one of the sleeping cars of a south-bound passenger train on the Indianapolis, Cincinnati & Lafayette Railroad was thrown violently down the bank by a broken rail.

On the afternoon of the 10th, near Gassett's Station, Vt., on the Rutland Railroad, a freight train broke through a bridge, and thirteen cars went down into the stream. A broken wheel was the cause.

On the evening of the 10th, about four miles from Peoria, on the Peoria & Rock Island Railway, seven cars of a south-bound freight train jumped the track and rolled down a bank 40 feet high, and a brakeman was severely hurt.

On the night of the 10th, near Grass Lake, Mich., on the Michigan Central Railroad, there was a collision between two freight trains, by which an engineman was injured and several cars badly wrecked.

On the night of the 10th, eight cars of a freight train on the Madison Extension of the Chicago & Northwestern Railway were thrown from the track and wrecked north of Madison, Wis.

On the night of the 10th, between West Rutland and Castleton, Vt., on the Rensselaer & Saratoga Railroad, an extra engine on its way southward was thrown from the track by a broken rail.

On the night of the 10th, about 60 miles east of St. Louis, on the Ohio and Mississippi Railroad, an east-bound express train ran into two freight cars which had been blown from a switch upon the main track, destroying these cars and throwing the locomotive off the track, slightly injuring the engineman and fireman.

On the night of the 11th, at Somerville, N. J., on the Central Railroad of New Jersey, a train was thrown from the track by an accumulation of ice on the rails, and the engineman was slightly hurt.

On the morning of the 11th, near Penn Yan, N. Y., on the Northern Central Railway, a freight train left the track and six cars were broken up.

On the morning of the 12th, eight cars of a freight train on the Richmond Branch of the Louisville & Nashville Railroad were thrown from the track at Gilbert Creek, Ky.

On the 12th, a mail train on the Grand Trunk Railway jumped the track at Utica, Mich., and several cars were wrecked.

On the evening of the 12th, near Sutherland Falls, Vt., on the Rutland Railroad, an extra engine which was backing after an express to act as helper to a freight jumped the track and was overturned. "It is supposed an axle under the tender was broken."

On the morning of the 13th, an up passenger train ran into the rear of an up freight on the Lehigh Valley Railroad, between Biery's Bridge and the Catasauqua depot, damaging the passenger engine and crushing an empty freight car.

At noon on the 13th, in Harrisburg, on the Pennsylvania Railroad, there was a collision between two locomotives at a switch in the yard, causing considerable damage to both.

On the afternoon of the 13th, a snow-plow, which was attached to the rear end of a train on the Maine Central Railroad, jumped the track between Waterville and Vassalborough, tearing up the track for two miles before it was discovered. The extent of the damage was not discovered until the sectionmen passed over the road.

About 2 o'clock on the afternoon of the 13th, as a freight train on the New York Division of the Pennsylvania Railroad was backing on a switch at the Market street depot in Newark, N. J., the rear car jumped the track and ran against a corner of the freight house, wrecking the car and damaging the freight house somewhat.

On the evening of the 13th, near the Schuylkill River bridge on the Lebanon Valley Railroad, twenty cars of an east-bound freight train were thrown from the track and wrecked.

On the night of the 13th, near Ruggie's Station, on the Wilmington & Weldon Railroad, a passenger train ran off the track.

On the night of the 13th, between Evansville and Magnolia, on the Madison Division of the Chicago & Northwestern Railway, two coaches of a south-bound passenger train were thrown into the ditch by a broken rail, and a sleeping car thrown across the rails. One passenger was injured.

On the morning of the 14th, part of a north-bound freight train on the Utica & Black River Railroad jumped the track near a bridge above Carthage, N. Y., and the engine, tender and two cars rolled down the bank at the bridge, the latter being ruined.

On the 14th, between Dunleith and Galena, Ill., on the Illinois Central Railroad, a freight train jumped the track and ten or twelve cars were broken up.

On the afternoon of the 14th, six cars of a freight train on the Oswego & Rome Railroad were thrown from the track and piled together in the ditch near Pulaski, N. Y.

Early in the morning of the 15th, near Scrub Grass., Pa., on the Allegheny Valley Railroad, a freight train ran into the engine of another freight train which had been switched to permit the other to pass, but projected beyond the switch. Both engines were wrecked, and a number of cars broken up.

On the 15th, about 8 a. m., on the Quincy & Burlington Branch of the Chicago, Burlington & Quincy Railroad, near Stillwell, Ill., one truck of a freight car left the rails and was dragged in that condition about half a mile, when the center pin broke and the truck ran back and knocked other trucks out of place. A fallen brake is supposed to have caused the mischief in the first place.

On the 15th, a south-bound passenger train on the Chicago, Dubuque & Minnesota Railroad jumped the track near Guttenberg, Iowa, having a little before knocked a six-ton boulder from the track at the expense of its cow-catcher.

On the evening of the 15th, a freight train on the Concord Railroad was thrown from the track near Hooksett, N. H., and one car was badly wrecked.

On the morning of the 16th, a freight train on the New York Central & Hudson River Railroad ran into an engine which was taking in water at a tank in Albany, and knocked it from the track, injuring the fireman badly.

On the 16th, the sleeping car and one coach of a west-bound passenger train on the Jacksonville, Pensacola & Mobile Railroad were thrown from the track near Lake City, Fla., and one passenger was severely bruised. It is supposed that obstructions had been placed on the track.

On the 16th, east of Binghamton, N. Y., on the Erie Railway, a freight train was thrown from the track and blocked it most of the day.

On the afternoon of the 17th, two miles west of Worcester, Mass., on the Boston & Albany Railroad, the third car from the rear in a west-bound freight train jumped the track and was dragged about 200 feet to a bridge, where two cars went into the brook and a third was left on the edge of the bridge. One person was slightly hurt by jumping from the train.

On the evening of the 17th, near the Wild Cat Bridge, on the Kansas Pacific Railway, a car of a freight train was thrown from the track by a loose wheel.

On the evening of the 17th, the engine and tender of an east-bound freight train on the Toledo, Peoria & Warsaw Railway were thrown down the bank, and one car from the track, by a misplaced switch at Saville, Ill. The fireman was dangerously injured.

On the night of the 17th, about three miles from Altoona, on the Pennsylvania Railroad, as an oil train was running down a steep grade, it broke in two, and shortly after the rear portion struck the forward part with such force as to break a tank. Then the oil caught fire and sixteen cars and 200 feet of track were burned. A boy, who is supposed to have been stealing a ride, was burned to death.

On the morning of the 18th, in New Haven, Conn., on the New Haven & Northampton Railroad, four platform cars of a freight train were thrown from the track by the falling of a brake.

On the forenoon of the 18th, near Henry's Station, Col., on the Denver & Rio Grande Railway, the rear car of a south-bound passenger train was blown from the track and over upon the bank by a violent wind from the mountains.

On the night of the 18th, at Lockport Junction, N. Y., one freight train ran into the rear of another, crushing through the caboose and the car next ahead and knocking fifteen cars from the track.

On the morning of the 19th, in Lockport, N. Y., on the New York Central & Hudson River Railroad, owing to a switch having been left open carelessly, the engine of an express train ran off the track close to the edge of the bridge.

Early in the morning on the 19th, on the Hannibal & St. Joseph Railroad, about two miles east of St. Joseph, Mo., there was a collision between west-bound and east-bound freight trains by which the engineman and fireman of the west-bound train were killed, and a brakeman slightly injured.

On the 19th, at the crossing near Ravenna, Ohio, there was a collision between a pay-train on the Cleveland & Pittsburgh and an accommodation train on the Atlantic & Great Western, by which two men in the pay car and two on the accommodation engine were injured.

On the morning of the 20th, about five miles east of Bushnell, Ill., on the Toledo, Peoria & Warsaw Railway, a west-bound passenger train was thrown from the track, and the rear coach went down the bank, turning over twice before it stopped. One passenger was killed and three injured.

On the 22d, a freight train on the Indianapolis, Cincinnati & Lafayette Railroad was wrecked about sixteen miles from Indianapolis.

On the morning of the 22d, as an east-bound passenger train on the Vermont Division of the Portland & Ogdensburg Railroad was approaching the bridge over Moose Run, near St. Johnsbury, the baggage car and coach left the track, were dragged across the bridge, tore up the track and were pierced by rails.

On the morning of the 24th, near Grant's Junction, on the Troy & Boston Railroad, the rear coach of a west-bound passenger train was thrown from the track by a broken rail and dragged 600 feet over the ties, causing two other cars to leave the track. Seven passengers were injured.

On the 24th, at Crowley's Junction, Me., on the Farmington Branch of the Maine Central Railroad, a train ran off the track, and the trucks under a passenger car turned at right angles to the track, and their wheels were forced through the floor.

On the afternoon of the 24th, two miles south of Bangor, Mich., on the Chicago & Michigan Lake Shore Railroad, the engine of a north-bound mail train ran off the track and fell over into the ditch, killing the engineman, fireman and a brakeman. Track and rolling stock are said to have been in good order.

On the evening of the 24th, just north of New Hartford, N. Y., on the Utica, Chenango & Susquehanna Valley Division of the Delaware, Lackawanna & Western Railroad, a mixed train ran off the track.

On the night of the 24th, below Freeport, Ill., on the Illinois Central Railroad, there was a collision between a freight and a gravel train, making a bad wreck and blocking the road two hours.

On the morning of the 25th, just above Hoboken, N. J., on the Erie Railway, three cars of a west-bound freight train ran off the track.

On the 25th, the pay train on the Burlington, Cedar Rapids & Minnesota Railroad ran into a train on a side track at Kossuth, Iowa, demolishing the engine and ditching the tender and coach.

On the 25th, a freight train on the New York Central & Hudson River Railroad was wrecked by a loose wheel, west of Lockport, N. Y.

On the 25th, near West Bethel, Maine, there was a collision between a freight and construction train on the Grand Trunk Railway by which both engines and several cars were wrecked, and the conductor of the construction train seriously injured.

On the 25th, several cars of an extra freight train on the Erie Railway were thrown from the track in Paterson, N. J., causing slight damage.

On the evening of the 25th, two miles east of Elizabethtown, Ohio, on the Indianapolis, Cincinnati & Lafayette Railroad, the rear coach of an east-bound passenger train was thrown from the track by a broken rail and rolled down a steep bank. Five passengers were injured.

On the night of the 25th, about four miles north of Danville, Ill., on the Chicago, Danville & Vincennes Railroad, four cars of a freight train went into the ditch.

On the morning of the 26th, near Rocky Mount, N. C., on the Wilmington & Weldon Railroad, a first-class and a second-class car of a north-bound passenger train were thrown from the track by a broken rail on a trestle, and went down into the creek below. The conductor and express messenger and four other persons were injured. The sleeping car, behind those which were wrecked, did not leave the track. The rail is said to have been broken by a preceding train.

On the afternoon of the 26th, a west-bound train on the Wilmington & Western Railroad ran into a heavy boulder which had fallen upon the track a mile beyond Wooddale Station, Del., badly damaging the engine.

On the night of the 26th, at Eliot, Me., on the Portland, Saco & Portsmouth Railroad, there was a collision between two freight trains by which both engines and several cars were ruined. It is said that each conductor supposed the other train to be on the siding.

On the afternoon of the 27th, nine cars of a freight train on the Wisconsin Division of the Chicago & Northwestern Railway were thrown from the track and badly wrecked by a misplaced rail, a mile from Oshkosh, Wis.

On the night of the 27th, near Orillia, Canada, on the Canada Midland Railway, the rear car of a north-bound mail train was thrown from the track by a broken rail, and went down the embankment about 12 feet and turned over. Six passengers were injured, one of them severely.

On the 28th, a locomotive went through the canal drawbridge on the Central Ohio Division of the Baltimore & Ohio Railroad.

On the morning of the 28th, near Harrisburg, in the yard of the Pennsylvania Railroad, a freight train of the Northern Central Railway was thrown from the track by a misplaced switch. The engine was badly wrecked and the engineman injured.

On the afternoon of the 28th, the locomotive of a train on the Grand Trunk Railway ran off the track and down an embankment in Portland, Me. No one was injured, and all the cars remained on the track.

On the night of the 28th, at Liverpool Station, Pa., on the Northern Central Railway, there was a collision between up and down freight trains, shattering both engines and several cars. The wrecked cars caught fire, and about twenty, with their contents, were burned. A fireman was killed, and an engineman and conductor injured, the former dangerously.

On the morning of the 29th, a west-bound express train on the Great Western Railway of Canada was thrown from the track by a broken rail about 35 miles east of Detroit, and a sleeping car was overturned, caught fire and burned. Four passengers were badly burned.

On the evening of the 29th, a south-bound freight train on the Northern Central Railway caught a coal dump which had been left projecting too far from a siding and caused the wrecking of it and a car of lumber which caught it.

On the 29th, an east-bound freight train on the Pennsylvania Railroad was thrown from the track near Coatesville, Pa., and a lumber car turned upside down, severely injuring a brakeman. A rail loose at one end is charged with the accident.

On the afternoon of the 29th, near Isabella Station, on the Wilmington & Reading Railroad, as a freight train was running rapidly around a curve, two cars of lumber jumped the track and went down the bank.

On the night of the 29th, at Geneva, N. Y., on the New York Central & Hudson River Railroad, the engine and baggage car of a west-bound express train broke through a small bridge which had been undermined by recent floods, and the engineman and fireman were killed.

On the night of the 29th, about a mile and a half south of Shushan Station, on the Rutland & Washington Division of the Rensselaer & Saratoga Railroad, a north-bound express train was thrown down an embankment and the locomotive overturned by the sinking of the track under the engine, where the road-bed had been washed away by surface water. Two enginemen, the fireman and a conductor were on the engine, and the last two were killed and the others injured. One passenger was dangerously hurt and eleven less seriously. The cars were badly wrecked and the baggage car about half burned.

On the 31st, in Portland, there was a collision between two engines on the Boston & Maine Railroad, one being attached to a passenger train.

On the 31st, on the upper bridge at Albany, on the New York Central & Hudson River Railroad, there was a collision by which two locomotives and several cars were wrecked.

On the night of the 31st, a coal train ran off the track three miles east of Port Jervis, N. Y., delaying trains three hours.

On the 31st, two cars of a train on the Erie Railway went off the track at Chetunk Bridge.

About the middle of the month, there was collision between trains on the Alabama South & North Division of the Nashville & Great Southern Railroad, by which one passenger was severely injured

Near the end of the month, eight cars of a freight train at the Middletown Branch intersection of the Mount Joy Railroad were thrown from the track and wrecked by the breaking of a wheel.

Near the close of the month, a sleeping car on the Ohio & Mississippi Railroad, jumped the track near Washington, Ind., and struck a freight car which was standing on a side track, dangerously injuring the conductor of the sleeping car.

Of these 112 accidents, 12 caused death, and 27 others injury to persons. These 39 accidents killed 18 and injured 92 persons. The accidents of the month may be classed as follows as to their nature and causes:

DERAILMENTS.	
Unexplained	42
Broken rail	19
Broken wheel	3
Misplaced switch	3
Roadbed washed out	2
Broken axle	2
Loose wheel	2
Broken truck	1
Fallen brake	1
Wind	1
Misplaced rail	1
Loose rail	1
Spreading of rails	1
Ice on rails	1—80
COLLISIONS.	
Rear collisions	12
Head collisions	8
Crossing collisions	6
Unknown	2—28
Broken truck (no derailment)	1
Broken driving tire (no derailment)	1
Accidental obstruction (no derailment)	1
Unknown	1
Total	112

Defects or failures of rolling stock caused 12 of these accidents, and defects or failures of permanent way 24. Two of the collisions were caused by bad side-tracking (one end of the train being left in the way of cars on the main track), and two by cars being blown from siding to the main track.

The average number of accidents per day (that is, of that number which we get trace of) was 3.61, against 4.75 in February and 5.74 in January.

For the twelve months ending with March our record stands as follows:

	No. of Accidents.	Killed.	Injured.
April	22	13	33
May	27	9	33
June	44	63	114
July	31	35	66
August	63	15	49
September	71	24	104
October	90	29	102
November	103	37	114
December	112	42	133
January	178	40	199
February	134	25	126
March	112	18	92
Totals	986	350	1,164

It is perhaps sorry comfort to know that railroad transportation is less dangerous than something else; but in view of the disagreeable list above we may be justified in looking for that even. The late wreck of the Atlantic caused the death of one half more people than all the railroad accidents in the United States for a year. For, though we doubtless get only a fraction of the slighter accidents—a small fraction, doubtless, of those which destroy little property and injure no persons—we believe that few which cause death escape us. What concerns railroad men, however, is not the fact that traveling by rail is very much less dangerous than traveling by water, but that railroad traveling is more dangerous than it ought to be.

CIVIL ENGINEERS' CLUB OF THE NORTHWEST.

Specifications for an Iron Railway and Highway Bridge over the Missouri River at Nebraska City, Nebraska.

[A paper read before the Civil Engineer's Club of the Northwest, February 10, 1873, by W. W. Wright, Engineer of the Nebraska City Bridge Company.]

SUBSTRUCTURE.

The substructure will consist of two abutments and two piers, in the following order:

No. 1. *Stone Abutment* on bluff west side of river. Dimensions: 7 ft. x 28 ft. on top, with curved wing-walls 7 ft. wide on top where they connect with the abutment, and 5 ft. at the ends. Both abutment and wings to have a batter on the face of ½ inch to 1 foot in height. The height from foundation to bridge-seat will be about 45 feet. The wings will be finished with vertical parapet walls 3 feet wide and 4 four feet high, including coping.

The stone used must be from such quarries as may be accepted by the Engineer in charge of the work, and the quality of the masonry first class as regards strength. The wall to be laid with regular courses, decreasing in thickness from bottom to top, but no course to be less than 12 inches thick. The face to contain alternate headers and stretchers—no stretcher at any point to have less bed than one and one-half face, and the headers to hold the same size in the wall that they show on the face, and at least one third of them to be long enough so interlock in the interior of the wall with headers from the back. The face stone to have beds and joints accurately cut, and they must be dressed to lie on their natural beds. All face stone shall have a margin draught 1½ inches wide—the remainder of the face to be roughly scabbled off so that there shall be no projections exceeding 3 inches beyond the line of the joints. The stone for the back and heart of the wall to correspond as nearly as possible in thickness with the face courses; and while they need not be cut, they must be laid with great care so as to make the best bond. Headers in the back of the wall must be laid to interlock with those in the face. Coping must be 16 inches thick and cut according to detailed plan, and the stones for bridge-rests must extend the full width of the wall.

The face stone will be laid in cement mortar; the interior stones will be laid dry, and every course thoroughly grouted. The mortar and grout will consist of hydraulic cement and clear, sharp, river sand; both ingredients of such quality as the Engineer in charge shall approve, and they shall be mixed in such proportions as he may direct.

No. 2. *Combination Pier*, composed of cast-iron cylinders filled with masonry. There will be two main columns 8½ feet in diameter sunk to or imbedded into the bed rock, 20½ feet from center to center, and carried up to the bridge-seat. This iron shell will be cast in sections of 10 feet in length, with a thickness of metal of 1½ inches. These sections will be united by interior flanges 2 inches thick and 2¾ inches wide, drilled for 48 one-inch bolts. The bottom and top sections of each column will be cast with but one flange, and the lower end of the bottom section will be turned off to a knife-edge. The

ends of each section will be accurately faced in a plane perpendicular to the axis of the cylinder, so as to make air-tight joints. The metal to be hard, fine grained, gray cast iron, and the cylinder to be of even thickness, sound and free from honey-comb or any other defects. There will be 48 one-inch bolts at each joint in the columns, of best quality of wrought iron, with hexagonal nuts.

The columns will be filled with the best quality of concrete, or rubble masonry laid in cement mortar, from the bottom to a point 10 feet below the top; from here up the filling will be of cut stone, and it will be carried 2 inches above the top of the shell. On top of this interior column of stone will rest a cast-iron cap telescoping down over the shell 12 inches. The cap will have a thickness of metal throughout of 2 inches, except that portion of the cover intended for the bridge-rests, which will be made 4 inches thick. Before filling with masonry above low-water line, the interior of the shell will be lined with sheet iron, and thin strips of wood will be placed above and below the flanges of each joint, so as to allow for the free movement of the shell, as it may contract or expand from changes of temperature.

It will be seen by the above description that *the bridge is to be supported by the columns of masonry*, and when the pier is completed the iron shells are merely intended to protect and brace them. During construction they serve the additional purpose of coffer-dams to enable the foundation to be carried down to the required depth.

From high-water mark to the top of the columns, at intervals of about 10 feet, there will be a hollow cast-iron strut or brace extending from column to column, with a cross section of 40 square inches of metal; and between these horizontal braces there will be diagonal tension rods of 6 inches cross section. Passing through each of the braces and both columns will be a tie rod 2½ inches in diameter; this tie rod will be protected where it passes through the masonry by an iron cover having an interior diameter ¾ inch greater than that of the rod itself. Both main columns will be finished with an ornamental capital made of galvanized iron.

The pier will be protected by an *Ice-Breaker* or *Starling*, constructed in the following manner:

A column, similar in quality and construction to those of the main columns, will be sunk to the same depth 12 feet in the clear from the up-stream column of the pier, and be carried up 6 feet above low-water surface. On the top of this column will rest 5 fifteen-inch wrought-iron beams, which will extend horizontally to the up-stream column of the pier, where they will rest on a cast-iron bracket bolted to the column. Upon these beams will be riveted a floor of ½-inch boiler iron, upon which masonry will be started and carried up to high-water line. The up-stream ends of the horizontal beams will be protected by a semi-circular cast-iron cap, not less than three inches in thickness, bolted on top of the ice-breaker column. Between the main columns of the pier a similar floor for masonry will be constructed, supported by brackets bolted to the columns. Underneath the floor, and between the beams, a tie rod 3 inches in diameter will pass through the three columns, connecting them together.

The masonry to be of the best quality—each stone to be carefully cut and fitted to place, and laid in cement mortar. The whole face to be bush-hammered. The stone composing the ice-breaker will be dowelled together in the most substantial manner. The nose of the ice-breaker will have an inclination of 45° for half its height and 50° for the remainder, and will be protected by a strip of iron fitted and bolted to it.

The whole of the iron work comprising the pier to be carefully cleaned and thoroughly painted with two coats of paint.

No. 3. *Combination Pier*, precisely like No. 2.

No. 4. *Eastern Abutment*, like 2 and 3, with the exception of the ice-breaker, which will be omitted.

The columns of Nos. 3 and 4 will be sunk to the bed-rock, 44 feet below low-water line. Those of No. 2 will be sunk 10 feet lower, or 54 feet below low-water line, unless a foundation satisfactory to the engineer in charge is sooner reached.

Proposals for substructure must include all materials for the piers and abutments; all piling and scaffolding or other material and appliances for placing and securing them in position: all risks from high water or otherwise; and all that is necessary to make them complete for receiving the superstructure.

The entire work must be done in the most permanent and workmanlike manner, and to the satisfaction and acceptance of the Engineer in charge.

SUPERSTRUCTURE.

The superstructure will consist of three spans of 333 feet each from center to center of piers. The bottom of lower chord (or of suspended floor-beams, if used) will be 50 feet above high-water line, as shown on the profile prepared by the Bridge Company's Engineer.

The spans will consist of two trusses eighteen feet apart in the clear of end posts, or any projection tending to contract the roadway to a lesser width.

The top chord, subject only to compressive strains, may be of cast iron. Bids are invited for both wrought-iron and cast-iron top chord.

The posts or struts, and all other parts of the span subject to tensile or transverse strains, will consist of wrought iron exclusively. No transverse strains will be allowed, except on floor-beams and top lateral struts, the form of which shall be such as to effectually resist the strains herein given, observing in all cases that the factor of safety must not be less than 6.

Proposals will be accompanied by drawings in plan and elevations, showing the general arrangement of the parts, the height of the truss and other dimensions of the span, and also by corresponding diagram sheets giving the calculated strains for each member of the span, with the kind, size and weight of the material intended to be used in resisting those strains. The details of the design are left to the party or parties proposing to erect the bridge, subject, however, to the approval of the Board of Directors of the Bridge Company and their Engineer. Parties proposing for the work will also give a statement of the total number of pounds of cast iron and wrought iron in each span.

The computed maximum ultimate strength of every part of the superstructure must be fully equal to six times that required to resist fracture, failure by flexure or otherwise, under a moving load of 2,500 pounds per lineal foot of bridge; this moving load to be run in either direction across the bridge, and the maximum strains, as so developed, to be used on the diagram sheets.

Castings, when used, must be of the toughest and best quality, clear, sound and free from flaws, and the material of which they are made must stand the following test: A bar one inch wide and two inches deep, placed edgewise upon bearings three feet apart, to sustain a weight at the middle of 2,800 pounds.

All wrought-iron must be fully equal to sustaining a tension of 60,000 pounds per square inch of sectional area. From each lot of iron intended for chord bars, braces and all other parts subject to tensile strain, there shall be taken at least two of a kind in each span, and they shall be tested by hydraulic pressure up to the estimated ultimate strength given for them in the diagram of strains. If either specimen shall break, all others of like dimensions shall be rejected.

All members subject to tensile strain shall be proved by actual strain of 15,000 pounds per square inch of sectional area when finished, and before leaving the shops, and if any of them prove defective in any way they shall be rejected.

The tests under these specifications shall be made by and at the expense of the contractor, in the presence of the Engineer of the Bridge Company, or of an agent specially appointed by him for that purpose; and the Engineer aforesaid may reject any part of the work which may be unsuitable, or from imperfect workmanship or defective material would not stand the tests.

The contractor must warrant the bridge, after being erected, to stand the following tests:

Under the maximum moving load, as herein specified, moving at the rate of 10 miles per hour, the greatest deflection of a span shall not exceed two inches, and after removal of the load shall return to within one-half an inch of the original camber.

All the workmanship will be of the very best quality. All abutting joints to be planed, and all holes in iron to be drilled. Pins connecting eye-bars of chords, or tie-braces, shall fit the eyes within one one-hundredth of their diameter.

The iron shall be painted with one coat of red lead and oil before being exposed to the weather (except the pins, joints and other machine-cut work, which shall be covered with one coat of white lead and tallow mixed), and the whole to be painted with two coats after the bridge is raised.

The aforesaid bridge will be built in accordance with the general plans submitted; but before the construction is commenced, working drawings of not less than the scale of one inch to the foot shall be prepared by the contractor and submitted to the Chief Engineer for his approval.

Except the track-stringers, highway-stringers and floor planks, all parts of the superstructure will be of iron.

The track-stringers will be 14 x 19 inches when packed, composed of three pieces of pine timber, 6 x 14 inches. They are to be firmly bolted together and to the floor beams. The floor will consist of two thicknesses of three-inch plank, supported by the track-stringers and four additional stringers 12 x 14 inches. These additional stringers will be composed of two pieces of pine timber 6 x 14 inches, bolted together. Guard pieces eight inches square, raised three inches above the floor, will be placed on each side of the roadway next the trusses.

The railway track to occupy the center line of bridge, and the top course of floor plank to be flush with top of rails. On the inner side of the rails the plank will be chamfered off to allow space for the flanges of car wheels. The rails to weigh 56 pounds per yard, and to be put down in the best manner, with splicing bars, bolts and spikes complete.

The proposition must include all material for the bridge; all piling and scaffolding, or other material for raising it; all risks from high water or otherwise; and all that is necessary to erect the bridge superstructure complete in place ready for the passage of trains and wagons.

The bridge superstructure must be firmly fastened to the piers and abutments, as may be directed by the engineer in charge.

The entire work must be done in the most permanent and workmanlike manner, and to the satisfaction of the engineer in charge.

APPROACHES.

The western railroad approach will extend from the western abutment of the bridge to a connection with the Midland Pacific Railroad, at or near Buffalo street, in Nebraska City, a distance of about 4,500 feet. The work will consist of excavation, embankment, a tunnel 700 feet long, a bridge over South Table Creek, and some box culvert masonry in Boulware Hollow. The estimated quantities are given below, and plans for the different kinds of work to be done are shown on the profile.

Excavat on in cuts	31,200	cubic yards.
" tunnel	10,500	"
Embankment (to be borrowed)	50,000	"
Stone masonry in tunnel	2,000	"
Brick masonry in tunnel	1,500	"
Box-culvert masonry	300	"

Table Creek Bridge, 100 feet span, Howe truss, on pile abutments.

It is assumed that there will be no rock excavation in the tunnel, and that it will be necessary to line it throughout with brick and stone—the sides of stone and the arch of brick. A single line of railroad track will extend the whole 4,500 feet, the material of which, and cost of laying down, must be included in proposition.

The above quantity of embankment includes the amount necessary to carry the wagon road across Boulware Hollow—no estimate has been made for wagon road beyond that point.

The eastern railroad approach will consist of a trestle work 1,000 feet long from the eastern abutment, and then an earth embankment extending to grade 3,400 feet farther.

The wagon-road approach will be carried down alongside the railway trestle, the railway grade being 1½ feet per 100 feet, and that of the wagon road 5 feet per 100 feet.

Plans for the embankment and trestle are shown on the profile. The estimated quantities are given below:

Trestle, 700,000 feet B. M.
White oak piles, 450.
Embankment, 170,000 cubic yards.

A single railway line will extend from eastern abutment to end of approach, 4,400 feet, the cost of which must be included in the proposition. The weight of rails on the approaches, and the quality of track, must correspond with that on the bridge.

The entire work must be done in the most permanent and workmanlike manner, and to the satisfaction and acceptance of the engineer in charge.

W. W. WRIGHT, Civil Engineer.

Railroad Expenditures.

We reprint the following extract from a very able editorial in *The Engineer*. It is quite as applicable to this country as to Europe:

When a new line is proposed the civil engineer goes over the ground, takes his levels, maps out his route, designs all his bridges, stations, etc., and sends his estimates into Parliament. A bill is passed, and the line is made. Then, and not till then, a locomotive superintendent is appointed, and he, under certain restrictions, is instructed to take the line and work it. He is happy if he finds that the engines and rolling stock have not already been ordered by the civil engineer, and that a great mistake has not been made. We can call to mind a case in which, for a very crooked and heavy road, the constructing engineer ordered four eight-wheeled locomotives with a rigid wheel base 22 feet long, the engines having a single pair of drivers only. They were bought as "bargains," and they were sold a few months afterward as bargains for the second purchaser, but not before they had done much injury to the road and to the reputation of the line for efficiency. Nothing is better known than that the steepest gradient in a road of moderate length determines the power of the engines to be used; the very term, "ruling gradient," habitually adopted, proves that the truth is habitually recognized: yet civil engineers, to save a moderate addition to the first cost of a line, have ere now adopted without hesitation inclines that never ought to have been admitted, excusing themselves on the ground "that they were, if steep, very short, only three-quarters of a mile or so." If the railway system of Great Britain were to be laid out again to-morrow, millions of pounds sterling could be saved in working expenses, provided the locomotive superintendent who would have to work each line were consulted by the engineer who had to lay it out. One of the greatest mistakes in railway practice has lain in ignoring the mechanical engineer. In saying this, we mean nothing invidious to the civil engineer. No man is wise on all subjects, and nothing is more hopeless than the attempt to combine a thorough knowledge of civil and mechanical engineering. It by no means follows that because a man can lay out a line of railway, and superintend its construction with matchless skill, he must also be able to work it. We insist that locomotive superintendents have not been allowed sufficient voice in railway matters, and the consequence has been that lines do not and never can pay, which would have paid from the first, or would never have been made at all, if the engineer who had to work the traffic had been consulted. What, it may be asked, would or could a locomotive superintendent do? How could he influence the construction or working of a line? The answer is very simple. A locomotive superintendent, knowing his business thoroughly, while avoiding all frivolous objections, would act the part of a most efficient adviser to his professional brother. Inclines, likely materially to increase the cost of transportation by entailing the use of heavy engines, which in the absence of steep gradients might be dispensed with, would be avoided when possible; curves would be flattened; all the details of stations, sidings and goods sheds would be modified by his special experience. In a word, on a hundred points he would advise, guide and influence those who prepared the general designs of the line; and it is quite beyond question that at every step his influence would be found to be an influence for good.

We have said that the second cause leading to want of economy in working railway traffic is the absence of originality displayed by all but a few of the best men. A very moderate acquaintance with the working of railways will suffice to prove that railway men affect grooves. When an engineer is appointed locomotive superintendent of a line, he is tolerably certain to bring with him certain preconceived notions of fitness. Thus he may have been used all his life to outside-cylinder engines. His present appointment may be to a line where only inside cylinders are used. The chances are ten to one that the new man at once proceeds to put outside cylinders on the line, whenever he gets a chance. He knows all about such locomotives and what they will do, and he very naturally adheres to them, and no harm and much good may result. We very seldom meet with a man, however, who will depart a long way from received practice to introduce a novelty because he believes it to be good. For example, it is beyond question, be the cause what it may, that the locomotive engines used in the United States cost less money and do more work than English locomotives. No English locomotive superintendent, however, has ever proposed to build a locomotive from Yankee patterns and try it on an English line. The thing would be contrary to all precedent, and therefore it is not done. Again, it is certain that the railway carriages used on different lines differ in weight very much—on some they are lighter, on others they are heavier. Common sense tells us, however, that it is on the whole expedient that carriages should be as light as is consistent with strength, and that if it is possible to work one great line with carriages weighing, say seven tons, it cannot be necessary to work another great line with carriages weighing eight tons. The love of precedent, however, comes in and checks progress. No locomotive superintendent cares to try how light his trains may be made; and the consequence is, that a great deal of dead weight is hauled quite unnecessarily about the country. For this, however, the locomotive superintendent is not alone to blame. His directors hold out no encouragement to originality; they prefer to go on in what they call "the safe and steady groove," and all the interest in his profession is thus taken out of the engineer. Of course there are lines where the case is different, where we see the locomotive superintendent really his own master in all but the name; but this fact only lends force to our argument, for on lines so managed we, as a rule, meet with the maximum of efficiency and the minimum of expenditure in working the traffic.

There is a cause in continual operation keeping up the weight of passenger trains, which is seldom or never publicly noticed. This is the desire manifested by some railway-carriage builders to make up for inferior quality of material by increased quantity. We do not mean to imply that there is any dishonesty at work in the matter; railway companies, penny-wise and pound-foolish, will not pay a price which will suffice to secure the best possible materials and workmanship. Nothing remains, if wood

is bad, but to use more of it; and the same truth holds good of iron and almost every other constructive material. We once heard a railway official who had been examining some new carriages purchased by a company with which he had nothing to do, ask what they cost and what they weighed. He was told, and replied at once, "Good gracious! how you have been taken in. Why, we bought some carriages not a week ago from the same firm; they don't seat so many people and they weigh a ton a carriage more than yours do, for the same money." This represents a very common idea of economy. We recollect a firm in the North advertising, as their principal claim to patronage, that they make the heaviest portable engines for the power in the world. The system applied to railway carriage construction has, however, many objectionable features, which we regret to see are not quite as fully appreciated as they ought to be.

As regards the future of English railways, it may be said that the civil engineer has little or nothing to do. The most important economies which it is possible to expect must be worked out by the locomotive superintendent, and we would strongly urge on the directors the necessity which exists for giving to engineers the utmost possible latitude. Let them be careful to select only good men; but, having got them, directors should treat them as competent professional gentlemen, keenly interested in the prosperity of the line the traffic of which they have to conduct. In conclusion, we would add that great benefit would be likely to arise from the formation of a society of railway engineers, similar in its general features to the American Master Mechanics' Association, which has been often referred to in these pages. The interchange of ideas, and the collection and recording of valuable *data* for future reference could not fail, we think, to promote the working efficiency and economy of our railway system.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—Mr. A. L. Rives, of Pennsylvania, has been appointed General Superintendent and Chief Engineer of the Mobile & Ohio Railroad, in place of L. J. Fleming, resigned. Mr. Fleming, who has served his company for sixteen years, remains as its President and Consulting Engineer.

—The Keosauqua North & South Railroad Company recently organized by the choice of the following officers: President, Charles H. Fletcher; Secretary, George Henry; Directors, Charles H. Fletcher, J. B. Blakemore, R. Lea, William Kreig, V. P. Towmbly, J. J. Kinnersley, Abe Wilkins and George A. Henry.

—Mr. William Mahl, for a number of years Auditor and Purchasing Agent of the Louisville, Cincinnati & Lexington Railroad Company, has resigned to accept the position of Auditor of the Texas & Pacific Railroad Company, with headquarters at Marshall, Texas. Mr. Mahl's reports, as given in the annual reports of his company, have been admirably complete and elaborate.

—A circular from Mr. A. A. Talmage, General Superintendent of the Atlantic & Pacific Railroad and leased lines, announces that Mr. E. L. Wentz has been appointed Superintendent of the Atlantic & Pacific Division, in place of M. G. Cary, resigned. His headquarters will be at Springfield, Mo.

—The new board of directors of the Kansas City, Memphis & Mobile Railroad Company has elected the following officers; President, R. T. Van Horn; Vice-President, R. S. Stevens; Treasurer, H. M. Holden; Secretary, W. O. Mead; Attorney, R. C. McBeth; Superintendent, A. D. La Due. Mr. Stevens is General Manager of the Missouri, Kansas & Texas road.

—Col. I. N. Ross, of Holden, Mass., has been appointed Superintendent of the Boston, Barre & Gardner Railroad, in place of T. B. Sergeant, resigned.

—Mr. Lucien W. Palmer, late Superintendent of the Connecticut & Passumpsic Rivers Railroad, has been appointed General Freight Agent of the Providence & Worcester Railroad. Mr. Palmer held this position before he went to the Connecticut & Passumpsic Rivers road, two years ago.

—Mr. W. H. Harrison, late Master of Machinery on the Pittsburgh, Washington & Baltimore road, has been appointed Assistant Master of Machinery on the Baltimore & Ohio, with headquarters at Piedmont, W. Va.

—The regular annual meeting of the stockholders of the Chicago & Alton Railroad Company was held in Chicago, April 7, and John Crerar, of Chicago, Lorenzo Blackstone, of Norwich, Conn., and John J. Mitchell, of St. Louis, whose terms of office had expired, were re-elected directors. As there was not a quorum of the board of directors present no other business was transacted.

—At the annual election of the stockholders of the Panama Railroad Company, April 7, the following board of directors was chosen: S. L. M. Barlow, Edwards Pierrepont, T. B. Musgrave, A. B. Stockwell, J. M. Burke, G. G. Haven, C. A. Hotchkiss, A. Masterson, S. J. Harriot, H. W. Gray, L. S. Stockwell, C. A. Avery, and F. W. G. Bellows. The number of shares voted on was 47,152, all the votes having been for the above ticket. Of the above thirteen names nine are new, and five of the nine are stock-brokers. The four directors re-elected are Messrs. A. B. Stockwell, A Masterson, L. S. Stockwell, and F. W. G. Bellows.

—At the annual meeting of the stockholders of the Pacific Railroad Company of Missouri, held at St. Louis, March 31, Messrs. W. H. Coffin, D. R. Garrison, John B. Henderson and Morris J. Lippman were chosen directors in place of the four whose terms expire. Mr. Coffin was re-elected; the other three replace Messrs. D. Rankin, Jr., Dwight Durkee and George E. Leighton.

—Mr. William A Ernst, late Superintendent of the Fort Wayne, Jackson & Saginaw Railroad, has been appointed Superintendent of the new Detroit, Fort Wayne & Logansport road, formed by the consolidation of the Fort Wayne, Jackson & Saginaw, the Detroit, Hillsdale & Indiana and the Detroit, Eel River & Illinois roads.

—At a meeting of the directors of the Toledo, Peoria & Warsaw Railroad Company in New York, recently, the old officers were re-elected, as follows; President, James A. Secor; Vice-President and General Superintendent, William H. Cruger, Secretary and Treasurer, Theodore Higbe; Assistant Secretary, Thomas H. Williams, of New York.

—At a meeting of the directors of the Lake Ontario Shore Railroad Company, held at Oswego, N. Y., April 2, the following officers were elected: President, J. G. Kellogg; Vice-President, Burt Van Horne; Secretary, H. L. Davis; Treasurer, Luther Wright. Mr. Kellogg replaces Mr. Gilbert Molleson as President.

—At the annual meeting of the Detroit, Lansing & Lake Michigan Railroad Company at Detroit, Mich., April 2, the following board of directors was elected: H. H. Smith, James F. Joy, Detroit, Mich.; Hampton Rich, Ionia, Mich; C. L. Young, H. A. Whitney, W. F. Weld, Nathaniel Thayer, George O. Shattuck, John A. Burnham, John W. Brooks, Charles Merriam, Boston, Mass. Messrs. Merriam, Young and Whitney are new members of the board.

—The European & Oregon Land Company, the purchaser of the Oregon & California railroad land grant, has chosen the following officers: Joseph S. Wilson, President; Faxon D. Atherton, Vice-President; Wm. S. Ralston, William Norris, John P. Jackson, Thos. Brown, Milton S. Latham, Jared L. Rathbone, R. Sulzback, Francis Avery and Jesse Holladay directors.

—A meeting of the directors of the Varna, Peru, Mendota & State Line Railroad Company was held in Chicago, April 5, for the purpose of electing officers. The following officers were elected: President, Charles Kellum; Vice-President, T. D. Brewster, of Peru; Secretary, J. H. Johnson, Woodstock; Treasurer, C. C. Merrick, of Chicago. The officers named were chosen to be an Executive Committee, and a resolution was passed ordering a preliminary survey of the line to be made at once.

—Mr. Edward H. Morris has been appointed General Freight Agent of the Poughkeepsie & Eastern Railroad, in place of George Marshall, deceased. Mr. Morris has for some time been in the employ of the Boston & Albany Company.

—Gen. F. M. Drake, of Centerville, Iowa, has been re-elected President, and Henry Hill, Superintendent, of the Missouri, Iowa & Nebraska Railroad Company for the ensuing year.

—The incorporators of the Wisconsin Midland Railroad Company met at Oshkosh, Wis., April 3, and organized by the election of the following officers: President, Col. J. L. Dorrance; Vice-President and Secretary, Edward Sargent; Treasurer and Superintendent of Construction, D. L. Harkness, of Berlin; Attorney, A. B. Hamilton, of Ripon; Chief Engineer, Harvey Tomilson, of Ripon.

—At a meeting of the directors of the Erie Railway Company in New York, April 8, Col. O. Chanute was appointed Chief Engineer, and Mr. A. R. Macdonough was chosen Secretary in place of H. N. Otis, resigned.

—The new board of directors of the Panama Railroad Company met in New York, April 8, and elected the following officers for the ensuing year: President, A. B. Stockwell: Vice-President, F. W. G. Bellows; Secretary, John Keeler; Treasurer, Henry Smith. These are all re-elections.

—Mr. George W. McMillan has been appointed Eastern Passenger Agent of the Chicago, Burlington & Quincy Railroad, with headquarters at Harrisburg, Pa.

—Mr. Isaac M. Cole, of Boston, has been chosen President of the Central Railroad Company of Iowa, in place of Mr. C. C. Gilman, who has resigned.

—The stockholders of the Absecom & Great Bay Railroad Company met in Camden, N. J., March 29, and organized by the election of the following board of directors: Jonathan Sovy, Peter Boice, Wm. Moore, Jr., B. W. Higbee, J. L. Warner, Theodore J. Shuster, Horace J. Subers, Wm. M. Burke, Jonathan G. Sterrett, E. Stanley Perkins, Charles E. Henry. Subsequently the directors elected H. J. Subers, President; Theodore J. Shuster, Secretary and Treasurer, and Wm. Moore, Jr., Solicitor.

—At the annual meeting of the stockholders of the Second Avenue (New York) Railroad Company, the following board of directors was elected: Thomas Crane, Edward Haight, Waldo Hutchins, Julius Wadsworth, Legrand Lockwood, George Bell, Joseph Richardson, John J. Donaldson, Augustus E. Masters, Solomon Merbach, Wm. S. Thorn, Frederick De Billier, James D. Fish.

—Col. J. C. Carpenter, of Kansas, has been appointed Attorney of the Missouri, Kansas & Texas Railway Company.

—The officers of the New York & Philadelphia Railroad Company, recently organized under the new general law of New Jersey, are as follows: President, Samuel K. Wilson; Treasurer, W. W. Stelle; Secretary, Robert K. Corson; Chief Engineer, A. B. Gillette; directors, Cortland Parker, Newark, N. J.; Samuel K. Wilson, William W. Stelle, Trenton, N. J.; Robert S. Green, Elizabeth, N. J.; Edward S. Wilde, Henry M. Hamilton, Bloomfield, N. J.; Charles H. Taylor, Orange, N. J.; Abraham J. Skillman, Somerville, N. J.; Algernon S. Cadwallader, Yardleyville, N. J.; Arthur B. Gillette, Attleboro, Pa.; Robert K. Corson, Philadelphia; Hugh S. Cole, Nicholas Murray, New York City.

—Colonel G. I. Foreacre, late Superintendent of the Western Railroad of Alabama, has been appointed Superintendent of the Macon & Western Railroad.

—It is rumored that Mr. O. H. Dorrance, now Assistant Superintendent of the Kansas Pacific Railway, will succeed Mr. O. Chanute as Superintendent of the Leavenworth, Lawrence & Galveston Railroad.

—At the annual meeting of the directors of the Erie Railway April 8, Mr. A. R. Macdonough was chosen Secretary in place of Horatio N. Otis, whose resignation was accepted, and the appointment of Mr. O. Chanute as Chief Engineer of the company was confirmed. Mr. Chanute comes from Lawrence, Kan., where he has been for some time Superintendent of the Leavenworth, Lawrence & Galveston Railroad, which, as well as the Missouri River, Fort Scott & Gulf road, was constructed under his supervision. He is better known among engineers, perhaps, as the engineer of the Kansas City Bridge, the first structure of the kind built over the Missouri, and one which was completed successfully in the face of great obstacles. Mr. Chanute has also had charge of city engineering works in Kansas City and also, we believe, in Leavenworth. The Erie could hardly have found a more capable man for the position.

—On the 8th, the new board of the Panama Railroad Company chose the following officers: President, A. B. Stockwell; Vice President, F. W. G. Bellows; Secretary, J. Keeler; Treasurer, H. Smith.

TRAFFIC AND EARNINGS.

—The earnings of the Great Western Railway of Canada for the week ending March 14 were: 1873, £23,640; 1872, £21,744; increase, £1,896, or 8¾ per cent.

—The earnings of the Grand Trunk Railway for the week ending March 15 were: 1873, £36,100; 1872, £31,100; increase, £5,000, or 16¼ per cent.

—The earnings of the St. Louis & Iron Mountain Railroad for the third week in March were: 1873, $61,530; 1872, $42,503; increase, $19,027, or 53¾ per cent.

—The earnings of the Chicago & Northwestern Railway for the second week in March were: 1873, $221,773; 1872, $170,446; increase, $51,327, or 30¼ per cent.

—The earnings of the Central Pacific Railroad for the month of March were: 1873, $974,460; 1872, $875,763; 1871, $614,446; increase, 1873 over 1872, $98,697, or 11¼ per cent.; increase, 1873 over 1871, $360,014, or 58¾ per cent.

For the three months ending March 31, the earnings were: 1873, $2,521,335; 1872, $2,039,822; 1871, $1,686,435; increase, 1873 over 1872, $481,513, or 23¾ per cent.; increase, 1873 over 1871, $884,900, or 54¾ per cent.

—The earnings of the Great Western Railway of Canada for the week ending March 21 were: 1873, £24,275; 1872, £22,279; increase, £1,996, or 9 per cent.

—The following companies have thus far reported earnings for the month of March:

	1873.	1872.	Increase.	Decrease.	P c.
Chicago & Northwestern	$959,911	$846,394	$113,517	....	13⅜
Erie	1,515,3-2	1,464,209	51.173	....	3½
Marietta & Cincinnati	180,467	150.7-4	29 683	....	19¾
Ohio & Missis-ippi	332 849	288.852	43 997	....	15¼
Central Pacific	974,460	875,763	98,697	....	11¼

—The earnings of the Louisville & Nashville Railroad, main stem and branches (excluding Memphis Branch), for the month of February were: 1873, $280,000; 1872, $236,913; increase, $43,087, or 18½ per cent. The earnings of the Memphis Branch were: 1873, $143,300; 1872, $169,499; decrease, $26,199, or 15½ per cent. The earnings of the Nashville & Decatur Division for February, 1873, were $76,600, and of the South and North Alabama Division, $70,700. The earnings of the road including branches and leased lines for the month were $570,600, or $705 per mile. The earnings of the main line were $784 per mile for the month.

PERSONAL.

—Mr. R. W. Chase, General Freight Agent; Mr. Luther Allen, Auditor, and Mr. C. T. Hobart, Superintendent of the Minnesota Division of the Northern Pacific Railroad, have resigned their respective positions.

—Mr. Hilton, Assistant Vice-President, Mr. H. N. Otis, Secretary, and Mr. J. D. White, Assistant Treasurer of the Erie Railway Company, have resigned their respective positions, and the resignations have been accepted by the board of directors.

—Mr. Andrew J. Day, General Western Passenger Agent of the Erie Railway, died at his residence in Chicago, March 30. Mr. Day has represented the Erie Railway at Cincinnati and at Chicago for the past fifteen years. He has been engaged in the business of transporting passengers for many years, having been Captain of a passenger boat on the Erie Canal before the railroads of New York were in existence.

—Frank Thomson, the newly-appointed Superintendent of Motive Power of the Pennsylvania Railroad, was presented with a White Chapel dog-cart, tandem whip and a pair of blankets, valued at $950, by the employees of the Eastern Division of the Philadelphia & Erie Railroad, of which Division he was Superintendent the past nine years. His span of horses were hitched up tandem to the cart and awaited his arrival from Altoona at the Williamsport depot on Saturday, March 22. He was presented with a letter by the committee on behalf of the employees, which said, very correctly and sensibly, "We the undersigned committee, on behalf of the employees of the Eastern Division of the Philadelphia & Erie Railroad, take pleasure in tendering you these articles as a token of their esteem for you while Superintendent of this Division."

CHICAGO RAILROAD NEWS.

Chicago, Dubuque & Minnesota.

A considerable addition has recently been made to the machinery of the shops of this company at Dubuque. The company is also seriously considering the question of completing the branch line running west about half way between the Iowa Division of the Illinois Central and the Iowa Extension of the Milwaukee & St. Paul road westward from La Crosse. 28 miles of this road are already completed, 46 miles more are partially graded, taking the road to about the west line of Fayette County. From this point the Iowa Pacific, running westward to Fort Dodge, is nearly graded, the distance being 133 miles. Propositions are now under consideration to complete all this road so as to make a branch of 180 miles connecting with the Chicago, Dubuque & Minnesota by the end of the present working season. This, with the 195 miles already in operation, will make the Chicago, Dubuque & Minnesota one of the very important roads of the country.

Illinois & Michigan Canal.

Navigation on the Illinois & Michigan Canal was opened between Bridgeport and Joliet on the 4th inst., and between Joliet and La Salle on the 11th. Boats are allowed to draw 4 feet 6 inches.

Chicago, Pekin & Southwestern.

This company will commence about next week to run regular trains to Peoria.

Pittsburgh, Fort Wayne & Chicago.

This road has been put into first-rate order this spring, steel rails having replaced all old or defective rails. The business is large and constantly increasing.

Chicago & Pacific.

This road has been completed to within about 8 miles of Elgin, and will be finished to that place within a few days. The company expect to put on a regular suburban train next week.

Chicago & Paducah.

The iron for the 50 miles between Fairbury and Monticello has been purchased and will be laid as soon as possible, commencing on the first of May. This is all that the company purposes to do at present. Later in the season they may decide to undertake still more work.

Chicago & Northwestern.

Work is completed on the first and third tunnel, which have been in progress for some time, on the Madison Extension. The middle tunnel is not done yet, but is being pushed forward towards completion as fast as possible.

ANNUAL REPORTS.

Northern Central.

This company's road extends from Baltimore north to Sunbury, Pa., 138 miles, with an extension from the depot in Baltimore to the docks at Canton, 4 miles, making 142 miles owned. It operates under lease the Shamokin Valley & Pottsville Railroad, from Sunbury to Mount Carmel, 28 miles, the Elmira & Williamsport road, from Williamsport, Pa., to Elmira, N. Y., 78 miles, the Chemung Railroad, from Elmira to Watkins, 22 miles, and the Elmira & Canandaigua road, from Watkins to Canandaigua, 47 miles—a total of 175 miles leased, and of 317 miles operated. The company also uses the track of the Philadelphia and Erie road from Sunbury to Williamsport, 40 miles, and the trains of the Philadelphia & Erie pass over the Northern Central from Sunbury to Harrisburg, 55 miles.

The operations for the year ending December 31, 1872, are given as follows in the annual report:

Earnings from passengers		$895,164 66
Freight		3,342,144 16
Express		110,463 33
Mails		39,682 50
Miscellaneous		231,365 54
Total ($14,507 per mile)		$4,598,820 19
The expenses were:		
For conducting transportation	$987,030 49	
Motive power	1,153,213 98	
Maintenance of way	796,795 90	
Maintenance of cars	425,626 21	
General expenses	74,384 39	3,437,050 97
Net earnings		$1,161,769 22

The expenses were 74¼ per cent. of earnings. As compared with the previous year, there was an increase of $331,921.34, or 7¾ per cent., in gross earnings, an increase of $457,313.11, or 15¾ per cent., in expenses, and a decrease of $125,391.77, or 9¾ per cent., in net earnings. The average amount received for moving one ton of freight one mile was 1.67 cents, as against 1.73 cents in 1871. The coal tonnage of the upper divisions has increased largely, the Elmira Division alone showing an increase of 19,438 tons. The coal tonnage of the main line shows only a small increase, owing mainly to the lack of terminal facilities at Baltimore. A large increase of these facili-

ties, in the form of wharves and warehouses for freight at Canton, and additional side tracks and coal dumps in various parts of the city of Baltimore, are required. New warehouses for freight near the present depot are also much needed. It is estimated that an expenditure of $2,000,000 will be required to provide for immediate wants.

The operations of the leased lines have been profitable, with the exception of the Elmira & Williamsport road, which shows a deficiency, after paying the rental, of $67,330.59. This is attributed mainly to the character of the road and its equipment, which is not suited to its present traffic. Heretofore its business has been mainly box-car freight, paying reasonably high rates and requiring only a light rail and light motive power. But the discovery of bituminous coal on the line and the largely increased demand for anthracite coal in the North have developed a large traffic, which must be carried at low rates. In order to carry this traffic profitably, the road must be well ballasted, and heavier rails and heavier locomotives substituted for those now in use. To put this line in proper condition for its present traffic will require an expenditure of about $1,000,000. It is believed that if these changes are made, the road will not only pay the rental, but produce a surplus, besides adding largely to the traffic of the main line.

During the year, in order to arrange the hitherto unsatisfactory character of some of the leases, the company has purchased nearly all the stock of the Chemung and the Elmira & Canandaigua companies. In payment for this stock, income bonds, payable in 50 years and bearing 7 per cent. interest have been issued to the amount of $2,750,000.

During the year $60,000 has been added to the sinking fund, making the whole amount of that fund $927,397.91.

The report closes by strongly recommending the lease of the road to the Pennsylvania Railroad Company, or its consolidation with that company.

Catawissa.

This road extends from Tamanend, Pa., on the Lehigh Valley road, west to Milton and thence north along the Susquehanna to Williamsport. The length of the road is 94 miles. The road was leased to the Philadelphia & Reading Company, and that company took possession on November 1, 1872.

The receipts for the ten months ending Oct. 31 were.....	$572,104 76
Working, maintenance and general expenses (68 per cent)	388,934 85
Net earnings.....	$183,169 91

The earnings of the road under the lease for November and December were $104,734 14, making the earnings for the year 1872 $676,838.90, or $7,200 per mile. This is an increase of $22,510.53, or 3½ per cent. over the previous year.

The workings of the extension to Williamsport have been satisfactory, but the earnings have been less than was expected, on account of the sharp competition to which the road was subjected.

During the year, under the authority conferred upon the board of directors, $1,000,000 of new preferred stock was issued, entitled to receive dividends as follows: For the year commencing November 1, 1873, 2½ per cent.; for the year commencing November 1, 1874, 4½ per cent., and thereafter 7 per cent. The payments under the lease will be sufficient to meet this, as well as the dividends on the old preferred stock and interest on bonds. The total amount of preferred stock is now $3,200,000, of common stock $1,159,500, and of funded debt $1,740,350, making the total capital account $6,099,850, or $64,892 per mile.

Northern, of Canada.

This company owns a road from Toronto, Canada, northwest to Collingwood, on Georgian Bay, 95 miles, with short branches from the main line to Barrie and to Bell Ewart, making a total length of line owned of 97½ miles. The company also leases the lines of the Northern Extension Railway Company, from Barrie to Atherly, 24¾ miles, and from Collingwood to Meaford, 20½ miles, making a total length of line worked of 142¾ miles. A considerable portion of the Northern Extension lines was opened only during a part of the year, making the average mileage for the year 125 miles. The receipts and expenditures for the year 1872 were as follows:

Gross earnings ($7,158 per mile).....	$894,774 40
Working expenses (59 per cent).....	528,509 88
Net earnings.....	$366,264 52
New construction and equipment.....	185,723 48
	$180,541 04
Balance from previous year.....	2,221 43
	$182,762 47
Interest account.....	179,229 60
Balance.....	$3,532 87

The gross earnings show an increase over the previous year of $117,275.46, or 15½ per cent. The percentage of working expenses was decreased from 59½, in 1871, to 59, in 1872. There was an increase in every item of receipts.

The company has asked for authority to consolidate its capital accounts, in order to simplify and settle its financial position. It has been determined to reduce the gauge from 5 feet 6 inches to 4 feet 8½ inches. To facilitate the lumber trade, a line of steam and sailing vessels is to be established between Toronto and Oswego, N. Y. Five locomotives and 120 cars were added to the equipment during the year. Considerable additions have been made to the depot buildings and wharves, and over 2½ miles of new sidings laid.

New York & Oswego Midland.

At the annual meeting of this company at Oswego, N. Y., April 2, the President, Mr. Dewitt C. Littlejohn, made a report of the condition of the road. The receipts and disbursements for construction to March 1, 1873, are as follows:

Receipts.

From subscriptions.....	$7,183,082 53
Mortgage bonds.....	10,454,055 16
Profits from transportation.....	368,911 73
Unfunded debt, mostly secured by mortgage bonds....	3,256,662 60
Total.....	$21,261,812 02

Disbursements.

Cost of road, buildings and real estate.....	$17,896,235 99
Equipment.....	2,241,918 53
Telegraph.....	55,812 82
Advanced to aid in construction of New Jersey and leased roads for which this company holds adequate securities.....	923,345 75
Total.....	$21,117,313 09

EQUIPMENT.

The equipment of the road is as follows: 84 locomotives, 51 passenger coaches, 30 baggage, mail and express cars, 359 box and stock cars, 609 flat cars, 17 caboose cars, 400 gondola cars, 96 gravel and ore cars, 196 four-wheel coal cars, 6 snow plows.

The company has a contract for 1,600 freight cars to be delivered at the rate of 40 per month, or as much faster as may be required, and also a contract for 26 locomotives, to be delivered during the spring and summer. It is intended to contract immediately for 24 additional locomotives, which, with the power on hand, will supply all wants for a year to come.

The company had hoped to have its road open through to New York by January 1, 1873; but its completion has been delayed by several causes, chief of which were the difficulty of procuring labor, the difficulty of providing the necessary funds and the severity of the winter. The grading is nearly all done, but it will take until the last of May or the middle of June to lay the track and do the necessary ballasting.

That part of the line from De Ruyter to Cortland, N. Y., was opened for business June 5, 1872. The New Jersey Midland was opened June 17, 1872. The Western Extension was opened for business from Cortland to Scipio Center, 37 miles, December 16, 1872. Surveys have been made for the extension of this line to the Niagara River. A considerable amount of money has been expended on the New Jersey Midland in ballasting and other improvements, the cost of which will be adjusted by the New Jersey Company. The opening of the Syracuse & Chenango Valley road gives a direct connection with Syracuse. The earnings of the road have been as large as could be expected in its incomplete condition.

OLD AND NEW ROADS.

Honduras Railroad.

Advices from Honduras state that Messrs. Waring Brothers & M'Candlish had thrown up their contract for this railroad, and had ceased to have any connection with it since the 16th of January. The trustees of the original "Honduras loan" had been appointed, and they had taken charge of the works, railroad, &c., which will be proceeded with in the event of the new loan now being floated proving a success.

Knoxville & Charleston.

This railroad was offered for sale at auction to satisfy the claims of the State of Tennessee, on the 2d inst., but was bought in by the State on a bid of $100,000, there being no other bidder.

Taxation of Baltimore's Percentage of the Baltimore & Ohio Earnings.

The opinion of the United States Supreme Court, read April 7 by Mr. Justice Hunt, in the case of The United States against The Baltimore & Ohio Railroad Company, settles the question that the United States has no power to tax that part of the earnings of a corporation which has been previously pledged to a State or municipality. In the case referred to, the city of Baltimore, for the purpose of bringing trade from the West to its citizens, did, by the consent of the Maryland Legislature, issue to the Baltimore & Ohio Railroad Company $5,000,000 worth of bonds to aid in the construction of the road. The condition was that the road should pay to the city a certain percentage of its earnings as a sinking fund, beside the interest on its bonds. The United States undertook to collect an internal revenue tax on the net earnings of the road before deducting the part that was to be paid to the municipality, and the company refused to pay. The Supreme Court holds that this tax, so far as it applied to the city's share of the money, was not a tax levied on the company, but upon the city, and it has often been decided that the United States cannot tax a municipal corporation, which is the representative of a State, so far as certain powers go, any more than it can tax the State itself. The tax ought not in this case, therefore, be collected.

Northern Pacific.

It is announced that this company has completed on favorable terms, and below the estimated cost, an arrangement for the extension of the road northward during the present year to a practical connection between the 65 miles of road already completed north from the Columbia River, and the waters of Puget Sound. The contractors on Saturday, by telegraph, put men at work on the line.

Texas & Pacific.

The change of the gauge of the old part of the line from Shreveport, La., to Longview, Tex. (formerly the Southern Pacific), from 5 feet 6 inches to 4 feet 8½ inches was completed April 1. Tracklaying west from Longview will be commenced at once. Track has been laid on the line from Dallas east to Syene. A new survey has been made from Dallas west to Fort Worth, reducing the distance to 31½ miles. On this section work will be begun immediately, and it is to be completed by September.

Oakdale & Wellsville.

A railroad is proposed to extend from Oakdale, Pa., on the Pittsburgh, Cincinnati & St. Louis, 14 miles west of Pittsburgh, northwest about 30 miles to an intersection with the Cleveland & Pittsburgh road near Wellsville, O.

Memphis & Raleigh.

The contract for completing the road-bed and laying the track has been awarded to McGavock & Tate, of Memphis, Tenn.

Brunswick & Albany.

The Augusta (Ga.) *Chronicle* says: "The bondholders propose to place $100,000 in the hands of George H. Hazlehurst, who is to be made the referee for both parties, for the purpose of settling all claims against the company. This sum will pay about one-third of the floating debt. If the offer is accepted, the bondholders declare that they will push the road forward to completion as rapidly as possible."

Wilmington, Charlotte & Rutherford.

The judge of the Superior Court for the ninth district of North Carolina, on complaint of some of the creditors of the company, has issued an injunction restraining the commissioners from selling this road. The sale was advertised to take place April 10.

Boston, Hartford & Erie.

The trustees under the Berdell mortgage have called a meeting of the bondholders, to be held in Horticultural Hall, Boston, April 17, for the purpose of organizing a new company to take possession of and operate the road. The mortgage provided that on failure of the company to pay interest the trustees could at once foreclose the mortgage, subject to a right of the company to redeem within eighteen months. The trustees took possession of the road September 13, 1871, and the company's right of redemption expired March 13, 1873.

It is claimed by the assignee in bankruptcy that the Berdell mortgage does not cover the lease of the Norwich & Worcester road or the equity of redemption in the Hartford, Providence & Fishkill road. If this view is supported by the courts, a certain amount of assets may revert to the creditors and stockholders of the company.

Wisconsin Central.

This company asked the late Legislature of Wisconsin to permit it to acquire title to public lands, so far as it has and shall continue to construct and complete any portion of its road. The Legislature, however, refused to pass the bill containing this provision.

New York & Philadelphia.

This is the title of the first company organized under the New Jersey General Railroad Law, which filed its papers immediately after the law had been recorded in the Secretary of State's office. The company (which is successor to the National Railway Company) is to continue 50 years. Its road is to extend from some point on the Hudson River or New York Bay though Bound Brook to the Delaware River at Yardleyville, a distance of 60 miles. The capital stock is $7,500,000. The necessary papers have all been filed and the company will at once take all the property of the National Company and proceed to complete the road. It is said that the company expects to have cars running from Philadelphia to Bound Brook by the end of July.

Mendota, Rockford & Beloit.

A new company, with a capital stock of $1,000,000, has been formed to build a railroad from Mendota, Ill., on the Chicago, Burlington & Quincy road, north through Rockford to Beloit, Wis., a distance of about 70 miles. The section from Mendota to Rockford, 53 miles, is to be first built. The directors of the new company are Gilbert Woodruff, C. I. Horseman, A. I. Enoch, N. C. Thompson, E. W. Blaisdell, Jr., Isaac Utter, Horace Brown, A. C. Spafford, P. Howes, William Peters, B. J. Heagle, C. B. Johnson and William Stocking.

Columbus & Toledo.

The City Council of Toledo, O., has voted to appropriate the $200,000 heretofore voted in aid of a railroad between the two places to the Columbus & Toledo Company, which purposes constructing the road on what is known as the "East line," by way of Fostoria, Upper Sandusky, Marion and Delaware.

Dunkirk, Allegheny Valley & Pittsburgh.

This is the name of the company formed by the consolidation of the Dunkirk, Warren & Pittsburgh and the Warren & Venango companies. The consolidated line extends from Dunkirk, N. Y., south to Warren, Pa., and thence southwest to Titusville, a distance of 90 miles. The section from Dunkirk to Warren, 55 miles, was owned by the first-named, and that from Warren to Titusville, 35 miles, by the latter company. The Warren & Venango road has only recently been completed.

Ware River.

The bondholders have instituted proceedings in bankruptcy against this company in the United States Circuit Court in Boston. The lease to the New London Northern Company was terminable by either party on 30 days' notice, and the necessary notice having been given by the Ware River Company, the lease expired March 31. The majority of the stock is now held by parties in the interest of the Boston & Albany Company, and it is probable that some arrangement will be made with that company.

Toledo, Tiffin & Eastern.

The first train over this road entered the city of Toledo, O., by the new bridge over the Maumee River, April 1. Regular trains will shortly commence running.

Long Island Central.

Surveys are being made for an extension of this road from its present terminus, near Farmingdale, to Port Jefferson, a distance of about 28 miles.

Colorado Central.

This road is now completed to a point 25 miles from Golden and six miles beyond Blackhawk, the late terminus.

Fort Wayne, Muncie & Cincinnati.

It is reported that negotiations are going on for the consolidation of this company with the Detroit, Fort Wayne & Logansport. The road extends from Fort Wayne, Ind., south 109 miles to Connersville, the junction of the Cincinnati & Indianapolis Junction and Whitewater Valley roads.

Indianapolis, Bloomington & Western.

Regular trains commenced running April 1 on the new Western Extension from White Heath, Ill., to Havana, on the Illinois River.

Atlanta & Richmond Air Line.

Trains are now running on the western end of the line to a point 86 miles from Atlanta and 10 miles beyond the late terminus.

Cairo & Fulton.

The bridge over White River was completed March 31. Trains can now run through from St. Louis to Little Rock without transfer.

Kentucky & Great Eastern.

Ground was broken March 31, at Maysville, Ky., for the western section of this line from Maysville to Newport.

Green Bay & Lake Pepin.

Since the city of Winona, Minn., failed to obtain from the Legislature the necessary authority to transfer to this company the bonds heretofore voted for the Winona & Southwestern road, several propositions have been made to the company by the city, but no definite arrangement has yet been made.

A French Book on American Engineering.

M. Malezieux, Professor of the Ecole des Pents et Chaussees, who was commissioned by the French Minister of Public Works in 1870 to visit this country, has published his report on the engineering works of the United States. It is comprised in two quarto volumes—the one consisting of letter press and the other large plates. *Engineering*, which contains a notice of the book, speaks very highly of its merits.

A Careful Engineman.

An engineman on the Providence, Hartford & Fishkill road recently discovered a loose rail ahead, stopped his train, got off and spiked the rail down and passed over in safety.

North Louisiana & Texas.

The Vicksburg (Miss.) *Times* says that credible information has been received that terms have been agreed upon by which this road will pass under the control of the Texas & Pacific Company. The road is now completed from Vicksburg to Monroe, La., 72 miles, and is to extend to Shreveport, 118 miles further.

Lewiston & Auburn.

A suit has been commenced to restrain the city of Lewiston, Me., from issuing its bonds in aid of this road. The petition alleges that the company was not legally organized and that the action of the city in calling the meeting which voted the bonds was illegal and informal.

Woodstock.

The town of Woodstock, Vt., has voted to guarantee the interest on $250,000 of the bonds of the Woodstock Railroad Company.

Manchester & Point Pleasant.

Work has commenced on this road, from Manchester, N. J., on the New Jersey Southern, east to Point Pleasant, a distance of about 14 miles.

Peoria & Rock Island.

The Rock Island (Ill.) *Argus* says that this company proposes to make an additional issue of mortgage bonds to the amount of $1,000,000.

Paris & Decatur.

The work of grading for the depot and side-tracks at Decatur, Ill., has been commenced. Preparations are being made to commence work on the extension to Peoria. The company has lately received two new passenger and 100 freight cars. An additional passenger train has been put on to accommodate the increasing travel.

Chicago, Millington & Western.

Negotiations are going on between this company and the Lafayette, La Salle & Clinton. It is thought that arrangements will be made by which the track between La Salle and Prince-

ton, Ill., will be built and used in common by both roads. Both companies intend building through the two towns named, which are about 21 miles distant.

Connecticut Central.

The town of Somers, Conn., has voted to take stock in this road to the amount of five per cent. of its valuation, or about $34,000.

Lewiston & Queenston Suspension Bridge.

Niagara township, Ontario, has voted to give this company a bonus of $5,000, and to exempt its property from taxation for five years.

Intercolonial.

It has been announced in the Canadian Parliament that the gauge of this road will be reduced from 5 feet 6 inches to the standard gauge of 4 feet 8½ inches. This will be made necessary by the approaching change of the Grand Trunk.

Buffalo, New York & Philadelphia.

The cars of the Empire Line have commenced running over this road from Buffalo to Emporium, Pa., on the Philadelphia & Erie road. This is one of the Philadelphia freight lines, and it brings the Pennsylvania into Buffalo as a competitor for freight with the New York Central and the Erie.

New Jersey & Delaware Central.

This company, recently chartered by the Delaware Legislature, purposes to build a railroad from a point on Delaware Bay opposite the terminus of the New Jersey Southern road at Bay Side, N. J., through Townsend, Del., to some point on Chesapeake Bay. Connection will be made by ferries with Baltimore on one end of the line and with the New Jersey Southern on the other. This is a partial revival of an old project, by which the New Jersey Southern road was to be part of a through line from New York to the South.

Cairo & Tennessee River.

Meetings are being held to advocate the construction of this narrow-gauge road, which is to extend from a point opposite Cairo, Ill., southwest through Mayfield, Ky., and Paris, Tenn., to Johnsonville, on the Tennessee River, a distance of about 100 miles.

Augusta & Greenwood.

It is proposed to consolidate this company with the Spartanburg & Union, and to build from Augusta, Ga., nearly due north to Union, S. C., and thence run over the Spartanburg & Union to the Atlanta & Richmond Air Line at Spartanburg.

Salt Lake City, Sevier Valley & Pioche.

It is announced that this Utah company has contracted for iron to lay 50 miles of road, and for two locomotives and a number of cars. It has 20 miles ready for iron and nearly as much more grading done.

Western Maryland.

The contract for the extension from Hagerstown, Md., southwest to Williamsport, about nine miles, has been let to Mr. Greenberry Watkins, of Montgomery County, Md., and work will shortly be commenced.

Indiana & Illinois Central.

Track-laying from Decatur, Ill., eastward will shortly commence.

Absecom & Great Bay.

This company intends to build a branch of the Camden & Atlantic road from Absecom, N. J., northwest to Leeds' Point, about seven miles. From Leeds' Point a ferry will be established to Tucker's Beach and Tuckerton. Stock to the amount of $300,000 has been subscribed, and work will be commenced at once.

Madison & Portage.

It is reported that this company has nearly completed negotiations in London for the necessary funds to construct the projected extensions of its road.

Narrow-Gauge Construction Company.

A company has been organized at Des Moines, Iowa, with a capital of $5,000,000, to engage in the business of building, equipping and operating narrow-gauge railroads.

The Omaha Bridge Question.

A dispatch from Omaha, Neb., dated April 4, says that the freight train from St. Joseph, on the Kansas City, St. Joseph & Council Bluffs Railroad, on that day crossed the bridge to Omaha, and it is stated that all the trains on that road will hereafter cross the bridge without any delay or transfer on the east side of the river.

Wisconsin Midland.

This company has been organized and claims to have good prospects for securing the necessary capital to build the road. The route proposed is from Oshkosh, Wis., in a general southwesterly direction through Berlin, Princeton, Portage, Montello, Arna and Mineral Point to the Mississippi River opposite Dubuque, Iowa. The length of this line will be about 160 miles.

Baltimore & Drum Point.

The contractors on this road, Messrs. Dickinson, Crowley & Co., have forfeited their contract.

Washington & Ohio.

It is stated that work on the extension of this road west from Hamilton, Va., has been commenced.

Chesapeake & Ohio.

The heading to the Lewis Tunnel, the last on the road, was put through a few days since. It is expected that it will be ready for cars to pass through by June next. Work on this tunnel was commenced in 1858.

A line of fast passenger steamers will be put on to run between Huntington and Cincinnati, as soon as express passenger trains commence running over the road.

The Norfolk (Va.) *Journal* says that the engineers of this company are making surveys for a line from Richmond to Yorktown. Two lines have been surveyed from Richmond to Williamsburg and three from Williamsburg to Yorktown.

Indianapolis, Bloomington & Western.

Several lines have been surveyed for the Western Extension beyond Havana, Ill., but the route has not yet been decided on. The company proposes to build the line to Quincy, provided $125,000 be subscribed. Of this sum about $50,000 has already been raised.

Pennsylvania.

The Pittsburgh *Commercial* says: "The Pennsylvania Railroad Company has already recommenced grading for the additional double tracks between this city and Philadelphia, and it is estimated that the enormous sum of $19,000,000 will be spent during the present year by the company within the State. Of this amount $3,000,000 will be expended on the Pittsburgh Division, extending from this city to Altoona, a distance of 117 miles. In the latter sum is included the cost of making the connection between the Pennsylvania Railroad and the Pittsburgh, Virginia & Charleston Railway, by bridge across the Monongahela above the mouth of Turtle Creek. This work is partly under way, and the estimated cost is $550,000. It is expected that the connection will be completed during the present year. The grading and excavating for the new double tracks between this city and Turtle Creek are already far advanced, and portions of the road-bed and tracks have been constructed. Other improvements will be made at this end of the line, which will absorb a considerable portion of the $3,000,000 to be spent on the Western Division.

Grand Trunk.

Mr. Alexander McEwen lately submittd to the board of directors of this company a plan for raising the means necessary to change the gauge of the road, increase its rolling stock, relay the line with steel rails and make the other improvements needed. The plan is to issue £10,000,000 pounds of new stock, to be sold at £20 per share, thus producing £2,000,000, with which sum the gauge could be altered and steel rails laid within two years. It was also proposed that, as far as possible, all rent charges, equipment bonds, postal bonds and small charges be consolidated into an issue of debenture stock, bearing 5 per cent. interest, and that the third preference shares be extinguished by giving the holders one-half second and one-half fourth preference shares. The fourth preference would then become third preference shares. The capital account would then be about as follows:

	Capital.	Interest Charge.
Debenture stock	£5,600,000	£280,000
Preference stock—		
First preference, 5 per cent	£3,210,000	160,500
Second ditto, ditto	2,325,000	116,250
Third ditto, 4 per cent	7,165,000	286,600
	12,700,000	
	$18,300,000	£843,350
Open stock	13,500,000	

It is believed that the increase of traffic which will follow the change of gauge and other improvements will be so great that the company will be enabled, not only to meet all its obligations, but also to commence the payment of dividends on the open stock.

Later advices state that this plan has been adopted and will be carried out as soon as some necessary legislation can be obtained from the Canadian Parliament.

Atlantic & St. Lawrence.

At a special meeting of the stockholders of this Company (which constructed the section of the Grand Trunk from Portland to the Canada line) held at Portland, Me., April 2, it was voted to accept the act recently passed by the Maine Legislature authorizing the company to increase its capital stock $1,000,000. The stockholders also ratified the action of the directors in instructing the Treasurer to endorse, in the name of the company, the bonds of the Grand Trunk Railway issued in renewal of the Atlantic & St. Lawrence bonds.

Burlington & Southwestern.

Tracklaying has been commenced from Cincinnati, Ia., southwest toward Unionville, Mo.

Northern Central.

This company has filed an answer to the complaint of Mr. John E. Hulme in the suit to restrain the company from leasing its road to the Pennsylvania Railroad Company. The answer, which is very long, gives a general denial to all the allegations of the complainant, and gives a detailed statement of the reasons for and necessity of the increase of the capital stock and funded debt. It also insists upon the right of the company to make the lease and states many reasons why the lease should be made.

Vera Cruz & Jalapa.

The *Two Republics*, published in the City of Mexico, says: We learn that the transfer of the "Zangroniz Concession" to the Mexican Railway Company has been approved by the Supreme Government; and that the company will proceed actively in the completion of this important road at the earliest reasonable period. The concession is for a railroad to the city of Jalapa.

Houston & Texas Central.

Texas papers report that this company refuses to transfer freight from the Missouri, Kansas & Texas at Denison, or at any other point than Red River City, the terminus of the Central. Red River City is about four miles north of Denison, and both companies have tracks between the two towns.

Trial of Westinghouse Brake.

An extended trial of this brake, with the latest improvements, was held near Boston on the Eastern Railroad, on the 8th, before a large assemblage of railroad men and others. A report of this trial will be given next week.

The New Jersey General Railroad Law.

This law having passed the Senate was sent back to the lower house, where a number of amendments were made. The Senate refused to concur in these amendments, and committees of conference were appointed. After making a few unimportant modifications, the committee reported the bill complete, and the report was finally accepted and the bill passed by both houses. It received the signature of the Governor on the 3d, and is now the law of the State.

The following summary of the bill as finally passed is from an official copy:

Section 1 prescribes that any number of persons, not less than thirteen, can form a company for the purpose of building, operating and maintaining a railroad, or for the purpose of operating any unincorporated railroad already built. They shall make articles of association which must specify the places to or from which the road is to be built, the counties through which it is to pass, the names of the directors (to be thirteen in number, a majority of whom must be residents of the State), the time the corporation is to continue, and the amount of the capital stock, which cannot be less than $10,000 per mile. Upon tendering these articles of association to the Secretary of State to be filed, the company shall become a legal corporation, with all the powers conferred upon corporations by the general law, and also power to take and hold the necessary lands, lay out and build the road, etc. The articles, however, shall not be filed until affidavit is made to the Secretary of State by five directors that $2,000 per mile of stock has been subscribed and 10 per cent. paid in. No stock subscriptions shall be received unless 10 per cent. of the amount is paid in at the time of subscribing. There shall be 13 directors, who shall appoint a President, Secretary and other necessary officers, but every director shall be a *bona fide* stockholder.

Provision is made for forfeiting stock on which assessments remain unpaid after due notice. The capital stock may be increased at any time by a vote of two-thirds of the stockholders at a meeting called for the purpose, but only to the amount actually required for the construction and maintenance of the road. The company shall be liable for debts incurred by contractors for labor, but any amounts so recovered directly from the company are to be deducted from money due contractors.

The road shall not be over 100 feet in width, except in cuts or embankments. Authority is given to enter and pass over any lands for the purpose of making surveys, etc., and to take and hold all lands necessary for the road, upon payment of damages. Lands are to be condemned in the usual form by commissioners, to be appointed by a Justice of the Supreme Court, an appeal being allowed to the Circuit Court of the County, the decision of which shall be final.

Companies must maintain good road-crossings and cattle-guards and must make provisions for farm-crossings where required. The streets of any incorporated city must be crossed above or below grade, unless the city council shall grant express permission to cross at grade. At all grade-crossings signs must be erected.

The company shall have power to fix rates of fare and freight, but the passenger fares must not exceed three cents per mile (no single fare, however, need be less than ten cents), and the rates for any description of freight between two way stations, or a way and a terminal station, must not be greater than those charged for the same class of freight between the terminal stations. The necessary land for stations, workshops, etc., may be taken, not exceeding ten acres at any one place.

Provision is made for the control of employees, treatment of passengers in case of refusal to pay fare, signals at road-crossings, checking and care of baggage, etc. All employees must wear badges when on duty. Cars enough must be provided to seat all passengers. State officers are entitled to free passage when on business. All roads must be fenced. In making up trains, no freight or baggage cars can be placed in the rear of the passenger cars of the train.

No company can occupy the road or lands of another company without its consent nor cross any other railroad at a less angle than 45 degrees. Connection can be made with any road now built or to be built, and in case of disagreement between companies, the dispute shall be settled by commissioners to be appointed by the Supreme Court. In case of disagreement with the Post Office Department as to carriage of the mails, commissioners shall be appointed by the Governor to settle the matter.

Where bridges over navigable streams are required, the bridge must be at right angles with the channel, and sufficient draws, with proper signals, must be maintained. The riparian commissioners are authorized to sell any land under water required.

Bonds may be issued to any amount not greater than that of the capital stock. Full authority is given to consolidate with other roads in or out of the State, to lease the road to other companies, or to lease other roads.

A sworn statement shall be made on the first Monday in January of each year of the cost of the road and equipments to date, and a tax of one half of one per cent. annually shall be paid on the cost of the road, and such other taxes as may be required by general law. The real estate of the company, except the road-bed, 100 feet wide, and its personal property shall also be liable to tax in the townships through which it passes.

No franchise heretofore granted, or hereafter to be granted to build or operate any railroad, bridge or ferry shall be held to be exclusive unless expressly so provided in the grant.

Companies organized under this act must commence their road within six months and complete it in two years from date of commencement, if less than 50 miles long. An additional six months is allowed for every additional 20 miles. The road must be opened for business when 50 miles is completed.

Finally, in case of the repeal or alteration of this act, such repeal or alteration shall not affect any company organized under the act unless it shall be expressly so stated.

Northern Aroostook.

Surveys for this road have been commenced at Mattawamkeag, Me., which is on the European & North American road 58 miles northeast of Bangor.

Columbus & Hocking Valley.

This company filed a certificate of the increase of its capital stock from $1,500,000 to $2,500, 000, with the Secretary of State of Ohio, March 27.

Port Royal.

The stations and distances on this newly-completed road are as follows:

Port Royal, S. C	0	Cambellton	55
Beaufort	4	Allendale	60
Sheldon	18	Appleton	64
Yemassee	25	Biddock	68
Varnsville	4	Millett	76
Hoover's	45	Ellenton	90
Brunson's	51	Augusta, Ga	111

At Yemassee, 53 miles from Charleston and 51 from Savannah, the road crosses the Savannah & Charleston Railroad.

Railroad Taxes in Pennsylvania.

The Harrisburg (Pa.) *State Journal* gives the following statement of taxes paid by some of the railroad companies of that State during the year ending November 30, 1872:

Pennsylvania	$883,335 30
North Pennsylvania	50,013 38
Philadelphia & Reading	281,514 65
Philadelphia, Germantown & Norristown	52,445 17
Philadelphia, Wilmington & Baltimore	14,990 18
Philadelphia & Trenton	7,087 80
West Chester & Philadelphia	8 632 71

"The enormous amount contributed by the Pennsylvania Railroad Company is itemized as follows: Tax on corporation stocks, $184,715.12; on loans, $97,893 41; on gross receipts, $149,238.58; on tonnage, $91,488.19; and commutation tonnage tax, $360,000."

Louisville & Nashville.

This company contracted last fall for 32 new locomotives from the Rogers Locomotive Works at Paterson, N. J., 16 of which have been delivered. The company has also added 750 freight cars to the equipment since September, and lately contracted with the Ohio Falls Car Company at Jeffersonville for 300 additional cars.

Jacksonville & St. Augustine.

The Florida Legislature has granted this company authority to extend its (projected) road from St. Augustine, Fla., south about 40 miles to the Halifax River, and to increase its capital to $1,500,000. Authority is also given to the company to use rail of not more than 30 pounds to the yard, or angle iron rail, if preferred.

North Pacific Coast.

The surveys are completed from Saucelito, Cal, on San Francisco Bay, north through Tomales to Duncan's Mills on the Russian River, a distance of about 80 miles. It is not proposed to extend the road beyond the Russian River at present. Work has been commenced and the company hopes to have a large part of the road completed during the present year.

White River Valley & Texas.

This company purposes building a railroad from Jacksonport, Ark., on the Cairo & Fulton, south down the valley of White River to Duval's Bluff on the Memphis & Little Rock road, and thence southwest to the Texas line. From Jacksonport to Duval's Bluff the distance is 65 miles, and from Duval's Bluff to the Texas line 200 miles. Some local aid has been secured.

Vicksburg & Nashville.

The annual report of the President of this company says that upon the first 25 miles, originally let, all the clearing has been done; 20 miles of road has been graded; the bridges built, the trestles and culverts completed, and the cross-ties delivered on the right of way. On this work the sum of $119,396 has been expended. The locating lines have been run from Okolona, Miss., to Grenada, and the line established from Okolona to Woodward, in Calhoun County, 28½ miles, and from Grenada to the Yallobusha River, 16 miles. A preliminary survey has also been made from Grenada to Greenwood on the Yazoo River. Iron enough to lay 35 miles of road has been secured and also the necessary rolling stock. It is hoped that the track on the first 25 miles can be laid this spring.